NATIONAL QUALITY FORUM

# Improving Attribution Models

*DRAFT REPORT FOR COMMENTING*

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## Contents

## Introduction

Historically, healthcare providers were paid predominately on a fee-for-service (FFS) basis. This payment system rewards providers for the quantity of service provided rather than the quality of care provided. In recent years, public and private payers have looked to value-based purchasing (VBP) and alternative payment models (APMs) as methods to reduce the growth of healthcare costs and to incentivize high-quality care. Catalyst for Payment Reform found that in 2014, 40 percent of commercial in-network payments were tied to value.[1] Similarly, the Healthcare Learning and Action Network found that for 2015 and 2016, across commercial, Medicare Advantage, Medicare FFS, and Medicaid market segments, 28 percent of healthcare dollars were tied to quality in some way, and another 29 percent were tied to alternative payment models.[2]

Value-based purchasing programs aim to realign incentives to focus on quality of care while alternative payment models build on the VBP framework to enhance care coordination and promote responsibility for patient outcomes. However, successful implementation of value-based purchasing and alternative payment models requires an understanding of who is responsible for a patient's outcomes and healthcare costs. Attribution is a methodology to assign patients, encounters, or episodes of care to a healthcare provider or practitioner. An attribution methodology seeks to accurately determine the relationship between a patient and his or her team to ensure that the correct entity or entities are accountable for the patient's outcomes and cost. Done right, this has the potential to motivate and drive ongoing improvement in quality and reduce cost. However, when the attribution approach does not accurately reflect the relationships of patients and healthcare practitioners or entities, it could potentially penalize clinicians and groups unfairly, reduce provider buy-in, increase provider attrition, and interrupt high-quality care delivery systems.

No universal standard currently exists for attribution models. However, evidence shows that changing attribution rules can significantly alter how a provider performs on cost and quality metrics. Healthcare outcomes are influenced not only by the actions of one provider but often by the actions of multiple providers as well as a patient's personal, social, economic, and environmental factors and the natural course of a disease. Measuring healthcare quality outcomes and resource use requires making decisions about who is responsible for an outcome with many potential influences. Attribution models attempt to create algorithms that untangle these complex relationships and determine who is accountable.

Understanding who is responsible is essential to driving improvements in care as well as for securing long-term buy-in from providers and facilitating the ability of value-based purchasing and alternative payment models to influence provider behavior. However, accurate attribution presents a significant challenge when a patient sees numerous providers in multiple settings for several conditions. Attribution challenges also include determining the relative influence that each provider has on a patient's outcomes and expenses.

In 2017, NQF issued its first guidance report on attribution models and defined the elements of an attribution model. While the contributions of the first effort were substantive, the Committee recognized the need for further guidance. This report further explores specific attribution challenges, outlines guidance on the design of an attribution model, and provides recommendations for refining the

Attribution Model Selection guide. Finally, this report will explore the paths forward for multistakeholder review of attribution models within NQF's endorsement and selection processes.

## Current Healthcare Quality and Payment Landscape

Public and private sector payers continue to look to value-based purchasing to reduce the growth of healthcare spending while incentivizing improvements in quality. Value-based purchasing can be defined as linking healthcare purchasing to quality.[3] In recent years, the healthcare system has looked increasingly to alternative payment models to promote smarter healthcare spending, improved quality, and better care coordination. Alternative payment models are payment approaches other than solely fee-for-service payments that give incentives to provide high-quality and cost-efficient care.[4] However, current value-based purchasing and alternative payment models are generally hybrids largely built on a fee-for-service architecture. Legislation such as the Patient Protection and Affordable Care Act of 2010 (ACA), the Improving Medicare Post-Acute Care Transformation Act of 2014 (IMPACT), and the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) implemented value-based purchasing and alternative payment models across the healthcare system. Additionally, the Department of Health and Human Services. HHS set a goal of tying 50 percent of traditional, or fee-for-service, Medicare payments to quality or value through alternative payment models, such as Accountable Care Organizations (ACOs) or bundled payment arrangements by the end of 2018. HHS also set a goal of tying 90 percent of all traditional Medicare payments to quality or value by 2018 through programs such as the Hospital Value-Based Purchasing Program and the Hospital Readmissions Reduction Program.[5]

Private sector payers have also continued to implement value-based payment models. Catalyst for Payment Reform reported that as of 2014, 40 percent of all commercial payments were tied to value.[1] Cigna has also announced a commitment to value-based purchasing and set a goal to ensure that half of their healthcare spending is in alternative payment models by 2018.[6] The Health Care Transformation Task Force, a coalition of private insurers and provider organizations, announced that its members are committing to move 75 percent of their contracts into alternative payment models by 2020.[7]

Attribution is an increasingly important aspect of measurement, performance improvement, and program design. Accurate and fair attribution is foundational to shift the healthcare system to value-based purchasing and alternative payment models, as payment and measurement require the ability to determine accountability. At the same time, the increased emphasis on team-based care in value-based purchasing programs and alternative payment models can make it unclear who has "primary" responsibility for a patient's outcomes and costs. The increased need to measure outcomes and costs of care also demands a better understanding of attribution. Attribution has been shown to be a critical aspect of measure design for resource use, outcomes, composite, and population health measures that are the bedrock of value-based purchasing programs and alternative payment models.[8]

Accurate attribution is essential to empowering patients to be informed healthcare consumers. Patients want to understand who is responsible for their care, and many want a say in determining who that individual or group of clinicians is. However, the design of the attribution model and its decisions may result in incorrect assignment of responsibility to a provider whom the patient may not believe is

primarily responsible for her or his care. For example, a patient may see a primary care provider to manage a chronic illness (e.g., hypertension) as well as a specialist for an unrelated acute condition (e.g., hip fracture). If the patient sees the specialist more often than the primary care provider, certain attribution models may assign responsibility for the unrelated chronic condition to the specialist based on plurality of visits. On the other hand, patients may disagree with how attribution models define the specialties that qualify as primary care providers. For example, some women may identify their gynecologist as their primary care provider while their payer's attribution model assigns them to another primary care provider with whom they have limited engagement. Finally, attribution models designed to exclude too many patients may fail to drive improvements for them, especially for patients with more complex needs and who are most susceptible to poor quality and higher costs.

Improvements in identifying a patient-provider relationship could have other benefits for patients as well. It may help patients identify a guide who can help them navigate care across providers, settings, and time. Likewise, providers may find new ways to help with coordination and communication with their patients, such as mobile health and telehealth.[9] Christensen and Payne found that while longer periods of attribution to an ACO were associated with increased use of primary care services, an overall reduction in costs and use of inpatient services also occurred.[10] In a technical paper on their attribution model, Health Partners noted the need to correctly identify a patient-provider relationship.[11] If done correctly, attribution can encourage a provider to ensure a consistent relationship with repeat visits and proactive outreach as necessary.

The first NQF attribution report reviewed current attribution models, defined guiding principles for attribution, developed the Attribution Model Selection Guide for measure developers and program implementers, and put forward a set of recommendations for the field (Appendix C). A significant finding in the first report was the current lack of a standard definition of the elements included in an attribution model. One goal of the Attribution Model Selection Guide was to lay out the standard elements of an attribution model to enable stakeholders to have a structured dialogue about attribution models and the decisions made when developing, selecting, or evaluating an attribution model.

The first NQF attribution report also developed a series of recommendations to apply broadly to developing, selecting, and implementing attribution models in the context of public and private sector accountability programs. When developing the recommendations, the Attribution Advisory Panel recognized the current state of the science, considered what is achievable now, and what the ideal future state is for attribution models. The recommendations stressed the importance of aspirational and actionable recommendations in order to drive the field forward:

- Use the Attribution Model Selection Guide to evaluate the factors to consider in the choice of an attribution model.
- Attribution models should be tested.
- Attribution models should be subject to multistakeholder review.
- Attribution models should attribute care to entities who can influence care and outcomes.
- Attribution models used in mandatory public reporting or payment programs should meet minimum criteria.

Since the release of NQF's attribution report in 2017, CMS has begun implementing the cost domain of the Merit-Based Incentive Payment System, highlighting the need to ensure clinician cost measures include appropriate attribution models.[12] At the same time, alternative payment models continue to proliferate, and CMS continues to approve additional advanced alternative payment models as part of the Quality Payment Program. Finally, CMS continues to look to quality measurement as the foundation of a system built on value. CMS recently announced its goal of empowering patients to be active consumers and foster competition based on quality.[13] At the same time, CMS noted the need to decrease provider burden and streamline the quality measurement enterprise. Attribution is the critical foundation to all of these health system goals.

## Objectives

This project explores a set of key attribution challenges, contributes to the development and dissemination of best practices, and spells out the key considerations for evaluating attribution models. These considerations will serve as foundation for future work to define criteria and specifications for attribution models. The attribution challenges explored in this report were identified based on feedback from public comments, recommendations from Committee members guiding the first project and input from HHS. The project will inform quality reporting and value-based payment models in both the public and private sectors.

At the outset of the project, NQF identified several key issues in attribution to address:

- Current approaches and best practices for testing attribution models;
- Unintended consequences of attribution;
- The challenges that data integrity and collection pose to developing attribution models;
- Approaches to attributing care in team-based care delivery models;
- Challenges in attributing complex patients and those in special populations and settings;
- Multistakeholder evaluation of attribution models as part of the endorsement and selection processes; and
- Recommendations for improving the Attribution Selection Guide, its dissemination, and use.

To accomplish these goals, NQF undertook the following steps:

1. Convened a multistakeholder Advisory Panel (Appendix A) to guide and provide input on the direction of the report, as well as engage NQF members and public stakeholders through interviews and surveys at key points throughout the project;
2. Conducted a review of the relevant evidence related to attribution and performed key informant interviews to gather qualitative data on implementing and testing attribution models;
3. Developed a written report that summarizes the evidence review, qualitative interviews, and recommendations; and
4. Developed a blueprint for further development of the Attribution Model Selection Guide into a more useful and user-friendly tool.

## Methods

This report was developed using multiple inputs: systematic evidence review, input from the Advisory Panel, and qualitative data analysis including key informant interviews and a survey of experts.

### Literature Review

In 2015, as part of the work for the *Attribution: Principles and Approaches* project, NQF commissioned a team of researchers to identify and evaluate current attribution models in healthcare. An initial commissioned paper informed the Attribution Committee's deliberations and recommendations for developing, selecting, and implementing attribution models in healthcare, as described in a final report in December 2016. The scan identified 171 unique attribution models. NQF reviewed the attribution models and publications identified in the original environmental scan, incorporating them into the findings and discussion where they included information relevant to particular subtopics.

For this new work, NQF expanded this literature review. The literature review identified publications dating from after 2015 that explored new attribution models, and offered new insights into testing and implementation of existing models. NQF added additional search terms based on the issues selected for focus in this effort, broadened the search to identify articles that incorporate attribution models as part of more general work on best practices, outcome and cost measurement, and measure alignment. NQF's search included a review of publications in grey literature, including foundational work by the Robert Wood Johnson Foundation (RWJF), and the Agency for Healthcare Research and Quality (AHRQ).

### Use Cases

The Attribution Advisory Panel recommended exploring use cases, or real-life examples of the implementation of attribution models, in order to bolster an otherwise limited evidence base, and help identify emergent implementation issues as they arose. Dr. Jennifer Perloff, a member of the Attribution Advisory Panel, presented a use case of a team-based alternative payment model developed at Brandeis University. In addition, the Panel discussed an attribution technical paper published by HealthPartners outlining the methodology for their total cost per member per month measure attribution. These two examples helped to test the robustness of the NQF Attribution Model Selection Guide in practice and highlighted key issues for consideration.

### Qualitative Interviews

Attribution remains a developing area of measurement science. As such, the evidence available in the peer-reviewed, published literature continues to be limited. To enhance the environmental scan, NQF selected five key informants to participate in a semi-structured phone interview. Each interview followed an interview guide developed by NQF with input from the Advisory Panel (Appendix D). The interviews focused on topics and stakeholder viewpoints that may not be available in the literature. Specifically, the interviews focused on the following topics: attribution concerns for special population and settings, unintended consequences, and testing. The interviews targeted the experience of consumers, attribution model implementers, and providers. These interviews helped to illuminate examples and opportunities for a path forward for the challenges identified.

NQF also solicited input from the NQF-convened measure evaluation and measure selection committees. Given the extensive measurement science experience in evaluating the scientific properties of individual measures for NQF endorsement and the program/policy expertise in the measure selection committees, these two forums were critical to guiding how to make this work actionable.

### Surveys

In addition to the key informant interviews, NQF conducted a survey to gather additional feedback from measure developers on the use of the Attribution Model Selection Guide and challenges they face with designing attribution models. This standardized survey was distributed online to nine selected participants. The decision to focus on measure developers as the key audience for this survey was based on a desire to solicit concrete, practical feedback from participants who are experts and steeped in measurement science and measurement principles. Survey recipients were selected based on their known expertise in successfully developing NQF-endorsed measures that are evidence-based, reliable, valid, feasible, and usable. The survey also targeted developers of outcome, population-based, and resource use measures, measures for which attribution often presents challenges. The survey was not intended to be a representative sample, and NQF has made an effort to elicit input from as diverse a group of measure developer respondents as possible.

## Results

### Literature Review

A re-examination of the published attribution models collected by Ryan et al. yielded new findings in the testing of attribution models, and the application of attribution models to special settings and complex patients, including pediatrics. The initial literature review found 89 percent of 171 identified models use retrospective attribution models, with assignments based on which provider, ACO, or other attributable entity was responsible for a plurality of administrative claims. However, other studies found models that use EHR, registration, scheduling, and billing data to identify patients prospectively using statistical methods. Data elements gathered through these alternative data sources—such as days since last physician visit, physician practice type (e.g., solo, collaborative), patient's state of residency—had a meaningful impact in provider attribution using statistical models.[14]

Although the expanded literature review yielded relatively few new articles, several findings helped contextualize attribution across the new dimensions of inquiry in this work. The literature review provided information about the current state of attribution models. As noted in the initial review by Ryan et al, limited information is available on the development and testing of attribution models.

However, more details were available on attribution models focused on specific populations. For example, the review found that research specific to the pediatric population indicated that value-based purchasing programs facilitated improvements in quality for a pediatric population.[15] The literature review also found information on how current models could be improved. For example, guidance from the Robert Wood Johnson Foundation (RWJF) emphasized the need to ensure that children are included in efforts to improve quality and promote care coordination though care delivery and payment

transformation efforts. However, when asked how attribution and risk-adjustment models for pediatric models could be improved, RWJF cited a state model as an example and noted the importance of incorporating social determinants of health into risk-adjustment models for care delivery models targeted primarily at the pediatric population.

The review also identified new work in implementing attribution models by groups such as the New York State VBP Workgroup.[16] Groups such as HealthPartners that have begun to systematically employ attribution models and publish their findings were also key to illuminating emerging concerns in the field.

## Use Cases

The Brandeis and HealthPartners' use cases identified three overarching themes where clarification is needed in the development and selection of attribution models. First, evidence is needed to support the choice to attribute a patient's outcomes to a certain accountable entity, particularly when attribution models are intended to drive health system transformation. Second, the use cases demonstrated that difficulty in testing attribution models continues. Specifically, there is a need to clarify how to examine testing at either the measure or the program level. Finally, there is a need to better understand how the attribution model aligns with its use. For example, should an attribution model consider the accountability mechanism of the program (e.g., payment or public reporting)? The use cases were also used as a tool to identify where enhancements to the Attribution Model Selection Guide could be made to improve clarity, provide more detailed guidance, and increase its usability. Improvements to the Guide will be discussed later in more detail.

## Survey

Of the nine participants who received a survey, eight completed and returned it. Overall, respondents found the Guide useful and identified areas in each section to make it more usable for measure developers. Specifically, respondents noted the need for more concrete guidance and illustrative examples for the type of evidence and testing that they can provide to support an attribution model. Developers also sought to understand how this attribution guidance would be incorporated into the measure information form used in the NQF endorsement process or the measure selection process. Respondents added that incorporating clinician feedback into the model evaluation would help bring out logic issues, such as accounting for patients that move seasonally. Respondents also cited operational data challenges to develop and share the attribution models and results, including challenges adapting electronic health records systems. Finally, the respondents encouraged the development of an electronic tool that would permit the inclusion of additional context-sensitive guidance of the current Attribution Model Selection Guide, as well as an index of existing attribution models and the performance measures to which the models apply.

## Qualitative Interviews

NQF completed interviews with five stakeholders including providers, consumers, payers, accountable care organizations, and quality measurement experts. NQF used a semi-structured interview guide to support these interviews.

The interviews focused on topics and stakeholder viewpoints around the key topics narrowly covered in the literature in order to supplement the findings of the literature review, surveys, and Advisory Panel discussions. The responses of the interviewees have been themed based on these topics:

### *Data Challenges*

Respondents noted the challenges in accessing data used to determine attribution. In particular, clinicians and providers pointed out that they frequently do not receive patient-level data about cost and quality outcomes. Clinicians and providers noted that the majority of payers use retrospective attribution, which can create a lag time of a year or more before they receive information about who was attributed to them and the quality of their care. Most had not had the opportunity to participate and were not consulted in the development of the programs' attribution approaches. Clinicians and providers said they would have liked to provide input on the models if afforded the opportunity. Additionally, they noted that real-time data would be more useful to support quality improvement efforts. Prospective attribution could resolve some of these issues, but respondents said that the potential data collection burden and misalignment between the assigned accountable entity and the patient's perception might challenge this approach to attribution. Respondents noted that the fragmented nature of the healthcare system contributes to data challenges. Health plans may only have claims data to support attribution models, while clinicians and providers have limited information about expenditures and charges assigned to them. Clinicians also noted the challenges in sharing data across care sites. The limitations of data sharing had several causes: limited data governance to share data across care sites, different EHR systems, and concerns around patient privacy.

### *Team-Based Attribution*

Respondents observed that team-based care is occurring but had mixed responses on how attribution could better reflect current models of care delivery. Respondents cited the need to identify a responsible party but recognized that current models may assign accountability to entities that may not influence results. In particular, respondents raised concerns that models may assign accountability to primary care physicians for events and encounters unrelated to their practice. Respondents gave differing responses on whether attribution models should include clinicians other than physicians, nurse practitioners, or physician assistants. Some respondents noted that attribution models should consider who is developing the treatment plan while others encouraged models that promoted shared accountability. Including nonphysician clinicians could promote more patient-centered care, encourage all team members to share responsibility, and could provide nonphysician clinicians with information about the quality of their care. However, attribution to a physician may be clearer, and a physician may have greater control over the patient's care.

Respondents noted the challenges to accountability within a team, especially if the members do not have accountability to each other such as the authority to hire or fire someone, develop clear protocols and practices that all team members agree to follow, or work in an established hierarchy with a clear chain of command. For example, a physician may have control over the procedures and staff in his or her practice, making it fair to attribute all care at that office to him or her. However, that physician may have less influence on the care provided to his or her patient if that patient is admitted to the hospital.

### *Consumer Perspectives in Attribution*

Attribution is not a concept familiar to most consumers; however, consumers want to know they are receiving quality care and someone is accountable for their outcomes. Attribution models that assign accountability to all parties involved in a patient's care may better align with consumers' views and help to promote patient-centered care. While these models may be more complicated to develop than models that assign patient care solely to one provider, consumers believe every person that interacts with that individual should be responsible for that person's care. Broadening responsibility may improve issues that are crucial to patients including care coordination and improved follow-up. Consumers want to know who is responsible for their care, but attribution information should be presented in a way that does not appear to limit choices about where to seek care or from which clinician. Patient attestation and prospective attribution could help drive improved patient experience, but information should be gathered in a way that emphasizes that patients can choose to seek care from another source if desired.

### *Special Populations and Settings*

Respondents highlighted the challenges in attributing patients who may require care from a greater number of clinicians, in a greater number of settings, and for longer lengths of time. Clinicians and providers noted challenges to influencing outcomes when care is delivered from many sources. Respondents also noted the challenges that social risk factors can pose with respect to patient outcomes and the potential need for attribution models to account for these factors.

### *Unintended Consequences*

Interviewees noted the potential for attribution to cause negative unintended consequences. Respondents from health plans and payer organizations expressed concern that patients who are not included in an attribution model would not be the focus of improvement efforts. Payer representatives also noted potential concerns about gaming attribution models by shifting vulnerable, complex, and high-cost patients using predefined exclusion criteria. Payers also noted potential concerns about the potential to exploit attribution models by targeting low-cost patients for inclusion in a provider's attributed panel by scheduling well-visits, while excluding higher-cost patients. Clinicians and providers expressed frustration about the unintended consequences of misattribution including the lack of focused attention on vulnerable and complex patients, financial penalties generated by cases outside their control, and challenges keeping colleagues invested in the value of quality measurement.

### *Testing*

Respondents noted the limited availability of information about the testing of attribution models. Clinicians and providers noted that details of attribution algorithms are not made available to them or to the public and that there is not enough information available about how models are developed or how payers determined that their model was valid. Respondents pointed out the limited evidence and lack of best practices as challenges to determining the appropriateness of an attribution model.

The interviewees consistently expressed concern that attribution remains extraordinarily challenging. First, data availability and sample size requirements can make it difficult to design and implement reliable attribution models. Key informants have invested significant resources in collating and cleaning

data in order to make more accurate assessments about attribution. Interviewees noted that attribution models may need to make trade-offs between including the broadest possible group of patients and ensuring the accuracy of the attribution. Second, patients with complex care needs drive the majority of spending but have the most difficult conditions to attribute accurately. The episodes of care for these patients are often managed by several providers, working both in sequence and simultaneously, sometimes reimbursed by different payers. Different payers may use different attribution models, which further complicates the challenge of attributing fairly and accurately for these important populations with high-cost quality gaps. Consequently, informants emphasized the importance of including patients with complex care needs, but did caution that in some cases the best way to achieve a scientifically sound attribution model might be to exclude those patients whose care is too fragmented to attribute accurately.

Key informants offered several recommendations for improving attribution models. First, interviewees emphasized the need for transparency. Maximizing transparency—in terms of the data being used for calculations, the calculation method itself (particularly the clinical risk adjustment, and if applicable, the social risk factor adjustment), and benchmark scores—builds trust with providers, which in turn feeds a cycle of participation in attribution models. Informants suggested that input early in model development, appeals processes, quality measure dashboards with prospective patient panels, and other mechanisms to allow providers to participate in the attribution determination all help foster trust, as well. Key informants generally supported attribution at the group level, and cautioned that attributing patients to individual clinicians can be technically challenging.

Key informants also highlighted an opportunity for the NQF Consensus Development Process and Measure Evaluation Criteria to evolve to accommodate key considerations in attribution modeling. At present, the process does not take these considerations into account, apart from an indirect relationship to validity of measure specifications and scientific acceptability. Key informants also noted that the measure submission materials could be expanded to collect additional information about the intended use of the measure that would include enough information about the attribution model to help standing committees make a determination about the use and usability of the measure.

## Discussion

This work explores a series of recommended evaluative considerations for attribution models through the examination of some key challenges with designing an approach. These considerations lay the groundwork for what should be evaluated and what best practices may look like to facilitate a multistakeholder review of attribution models. Future work should consider how these considerations can translate into criteria for measure evaluation and selection.

These potential evaluation considerations build on the results of the environmental scan and NQF's first attribution report. The first report emphasized that attribution models should be actionable, accurate, fair, and transparent. In its recommendations, the Committee outlined a series of minimum criteria for attribution models used in mandatory public reporting or payment programs. The Committee noted that in order to be applied to mandatory reporting or payment programs, attribution models should:

- use transparent, clearly articulated methods that produce consistent and reproducible results;
- ensure that accountable units can meaningfully influence measured outcomes;
- use adequate sample sizes, outlier exclusion, and/or risk adjustment to fairly compare the performance of attributed units;
- undergo sufficient testing with scientific rigor at the level of accountability being measured;
- demonstrate that the data sources are sufficiently robust to support the model in fairly attributing patients/cases to entities; and
- be implemented with an open and transparent adjudication process that allows for timely and meaningful appeals by measured entities.

## Evaluation Consideration 1: Does the attribution model assign accountability to an entity that can meaningfully influence the results?

The Attribution Model Selection Guide asks users to consider to what degree the accountable unit can influence the outcomes. The previous attribution report acknowledged the inherent tension between driving improvement in coordination between providers and the current structure of value-based purchasing programs that are setting or provider specific. In today's healthcare settings, multiple clinicians and facilities may be involved in a patient's care. Increasing evidence shows that a person's health outcomes are influenced by social risk factors and other determinants that may be outside of the control of the healthcare system, making interdisciplinary care teams crucial to meeting patient needs.

Attribution can be a powerful tool to drive change. The goal of an attribution model can be to ensure that patients have an entity take responsibility for their care and serve as their primary advocate who can help coordinate their care, navigate a fractured system, and promote high-quality outcomes. Many models assign accountability for a patient's cost and quality outcomes to one accountable entity, generally a primary care physician or the physician who had the most visits with the patient. Such models could help promote patient-centered care by having one provider take responsibility. However, such attribution models risk assigning accountability for outcomes that a provider cannot influence.

The first consideration for the evaluation of an attribution model is whether or not it assigns accountability to an entity that can meaningfully influence the results and if there is reasonable evidence to support attributing responsibility to that entity.

### *What is the evidence to support the assignment of responsibility?*

The NQF Attribution Model Selection Guide encourages its users to consider the evidence base when designing an attribution model. Evidence refers to the information used to determine the truth of a hypothesis. In this case, the evidence comprises the information used to demonstrate that the accountable entity can have a meaningful impact on the measured outcome. The Guide does not prescribe what type of evidence should be used or considered to support this decision. In its previous report, the Committee stressed the need to develop an evidence base that will allow evaluation of attribution models, as Ryan et al. found that current models are largely built based on approaches previously used.[17]

When testing the Selection Guide with the use cases, several important considerations for the evidence to support an attribution model emerged. For example, how should a developer proceed when research does not sufficiently demonstrate that the types of interventions and services an accountable entity provides will achieve desired outcomes and reflect high-quality care? Much of healthcare has not been subjected to research studies, much less with randomized controlled trials or comparative effectiveness studies that compare the level of influence that each accountable entity may exert on the measured outcome. As Lohr observed, "Perhaps no more than half, or even one-third, of services are supported by compelling evidence that benefits [of healthcare interventions] outweigh harms."[18]

Another key consideration is that attribution models may be used to incentivize change on important health outcomes but the evidence base to support such models may lag behind implementation. There is a need to balance incentivizing change with the lack of concrete support in the current evidence that demonstrates how an accountable unit can influence health outcomes. The 2011 NQF Evidence Taskforce convened to strengthen NQF's processes for evaluating the synthesis and scoring of evidence and presenting this information in ways that will be most useful to Steering Committees.[19] This Taskforce noted that health outcomes are central goals that integrate the influences of multiple care processes, disciplines, and accountable units involved in care. The NQF Evidence Taskforce further explained that patient outcomes not thought to be modifiable by accountable units tend to improve once the outcomes are measured and reported. This suggests that measurement drives identification and adoption of effective practices. For these reasons, the Evidence Taskforce noted that health outcomes do not necessarily require empirical evidence linking them to a known intervention by an accountable unit. While such evidence is clearly desirable, a conceptual rationale linking the measured health outcome to at least one healthcare intervention by the accountable unit would suffice. This rationale must be calibrated to the context and goals of the accountability program. For example, aspirational linkages between accountable unit interventions and health outcomes for mandatory payment or public reporting programs should be used with caution.

When designing an attribution model, the conceptual rationale supporting the linkage between the measured health outcome and an intervention that the accountable unit can undertake is critical. For example, when measuring NQF #0230 *Acute Myocardial Infarction 30-Day Mortality*, it is critical that a rationale of hospital interventions, such as use of appropriate medications, timely percutaneous coronary interventions and prevention of complications that are known to decrease the risk of death within 30 days of hospital admission is provided. This linkage must be evaluated in terms of the context and goals of the accountability program.

The Advisory Panel laid out potential ways to support the conceptual basis behind an attribution model: how the accountable entity can influence results, why a given set of rules was selected, and the consideration of consequences. These consequences can be explored via the patient perspective—such as the impact on complex and vulnerable patients—or the provider perspective—such as financial impact, provider attrition, or reputational impact. Multistakeholder review should be used to evaluate the conceptual basis. The Panel noted that the degree of multistakeholder input needed may depend on how aspirational an attribution model is or if the measure will be used in a mandatory high-stakes accountability program.

### *How does the model address complex and/or expensive cases?*

An inherent tension in attribution is the need to drive improvements for the patient with the concern that measurement may be unfair or results may be outside of the control of an accountable entity. Adding to this complexity is that the health needs and the course of disease may vary significantly for each patient. A healthy person may need few interventions and may only see a healthcare provider for wellness visits resulting in straightforward attribution and satisfactory cost and quality performance. Another patient may be managing multiple conditions that could be chronic or acute and need treatment plans that require input from specialists, hospitalizations, and costly medications. For these patients, distinctions between what each provider can influence start to blur. However, these patients may need attribution even more than others to ensure that someone is coordinating their care. Despite all of the inherent challenges, the drive for improvement must also ensure fair measurement for providers and avoid creating barriers to access for patients.

Social determinants of health can also complicate attribution. People have different resources available to them to support their health. For example, insurance status, ability to attend a doctor's appointment, ability to pay for medications, and access to transportation can all influence a person's ability to comply with treatment plans. Disparities plague the healthcare system, and people with social risk factors incur greater risk for poor outcomes caused by fragmented, poor-quality care.

The need to ensure meaningful influence and enable fair comparisons requires that attribution models address complex cases. Attribution models must balance including as many patients as possible with ensuring that providers are compared to those treating similar patient populations. NQF's first attribution report highlighted the need for additional guidance on how to handle complex and/or expensive cases. The Attribution Committee acknowledged that the design of an attribution model can vary by setting and type of patient. Some measures or accountability programs may have a straightforward attribution model, while others attempt to cross providers or settings, blurring who may ultimately be accountable.

The report also noted that attribution models should work across different populations and acknowledge the potential complexities for some cases. For example, commenters on the first report highlighted the need to examine attribution issues in areas such as oncology and behavioral health. These patients see more providers, across numerous settings, and for greater lengths of time. Their care can involve primary care clinicians as well as numerous specialists to manage specific conditions. They may suffer acute episodes and require hospitalizations. They made need post-acute or long-term care. Additionally, variables beyond those solely related to healthcare, such as a person's social risk factors, may affect outcomes. Commenters also highlighted the need to examine attribution issues in pediatrics. For pediatric patients, it may be clearer who the primary care physician is but more challenging to determine the outcomes of care, as the majority of children will be healthy and receive mostly preventative care or care for minor acute conditions. However, a small number of patients drive the majority of the spending, and attribution models need to account for these complexities and ensure fair comparisons.

Achieving the desired changes in the healthcare system will require promoting quality improvement and cost containment for as many settings and patients as possible. However, the nature of some settings and the care for some patients may raise special considerations for attribution. This section explores potentially complex settings and patient types to illustrate attribution considerations.

Attribution models should consider patient populations that may require care from a greater number of providers, for a greater length of time, and in a greater number of settings. Attributing these patients can promote shared accountability and drive improvements for those who may be most at risk for quality concerns. However, the effort to improve must balance with the evidence for what a provider can influence and ensure that attribution models do not cause access concerns for vulnerable and complex patients.

The Panel repeatedly acknowledged that attribution models must balance the desire to attribute complex patients with maintaining a realistic locus of control. A small number of patients drive the majority of U.S. healthcare spending. These patients are likely to see a large number of providers. Everett, et al. found that physician assistants and nurse practitioners are more likely to provide care to socially complex patients (e.g., Medicaid recipients, poor, and underserved).[20] While these providers often work as part of a collaborative team with physicians, they are also the providers on the team likely to see these patients most frequently but may not bill for services directly. Attribution models that do not account for team-based care delivery or for nonphysicians may miss the opportunity to include the healthcare provider that could be most likely to influence care and drive improvement. Additionally, these patients may also have multiple payers further complicating attribution of who may be held accountable for their outcomes.

Different attribution models may have different ways of handling complex patients. First, the model could use an algorithm to attempt to identify one provider to hold primary responsible. This approach has the benefit of simplicity and clarity; however, the results may not accurately reflect how care was delivered or may not account for unrelated conditions. For example, primary care physicians could be held accountable for care delivered outside of their control (e.g., in a hospital or by specialists). Similarly, a specialist could be held responsible for care for an unrelated diagnosis. Another option is to hold providers jointly accountable. However, it can be challenging to determine how to fairly determine what portion of an outcome an accountable entity should be held accountable for or how to separate out unrelated events. Finally, a model could attempt to assign by diagnosis rather than assigning all outcomes for a patient. This approach may have greater face validity if providers feel that they are only held accountable for expenditures and outcomes related to their area of expertise. However, this could pose statistical challenges and involve a greater data collection burden. This approach may also fail to promote patient-centered care.

Attribution models should ensure fair comparisons so that the quality of care can be fully understood. Some providers are doing innovative work to care for challenging patients. Attribution models should support these efforts by providing accurate data that account for potential differences in population. The Advisory Panel noted some strategies to enable better comparisons. One strategy would be to consider the exclusion criteria for the model. Additionally, attribution models could be improved by

ensuring appropriate risk adjustment for clinical and social risk factors to mediate the effects of potential outliers. Another strategy could be stratification or segmentation, as this technique would continue to include potentially complex patients but allow results to be examined by subpopulations.

The Panel suggested that attribution for more difficult cases could be possible at higher levels of analysis. It may not be possible to achieve accurate attribution at the individual clinician level; however, attribution to an ACO or system could enable attribution for a greater number of patients while minimizing the likelihood of attributing unrelated events to an individual clinician or penalizing a clinician for treating a more complex population.

Finally, there is a need to consider patients who are not attributed. Many of the most vulnerable or complex patients will not be included in an attribution model, as many of the traditional algorithms are triggered by claims. The Panel also noted the challenges to patients who may seek care in the emergency department rather than through a primary care physician. Other patients may see so many clinicians that it may be difficult to attribute their care to any one accountable entity, and such patients might therefore be excluded from attribution models. However, these patients may be most at risk to receive fragmented, poor-quality care and could benefit the most from attribution to help ensure they have someone responsible for coordinating their care and that they are included in the population assessed in a performance measure. In the public comment period on the first report, commenters cited the need for additional guidance on certain settings and populations including home health, oncology, pediatrics, and patients who may be particularly complex and/or vulnerable. The following examples illustrate current attribution practices and highlight potential concerns, while remaining ever mindful of the overarching need to balance the desire to attribute outcomes against the imperative of achieving fairness and accuracy in so doing.

### Considerations for Home Health Care

Home health care can be defined as a formal, regulated program of care delivered by a variety of health care professionals in the patient's home.[21] Home health has grown over the past decades because of patient preference to remain at home rather than in a setting such as a nursing home and because the delivery of care can be less expensive than in inpatient settings.[21] However, performance measurement in the home health setting can offer unique challenges that could influence attribution and a provider's locus of control. First, a clinician is with the patient for a limited portion of the time. Additionally, care is delivered in the patient's home, and the clinician or agency may not have control over the physical environment.

The growth of home health services plays a key role in a patient's episode of care and may drive a desire to include these services in attribution models. A review by the New York State Department of Health found that patients are most often attributed to home health agencies by their pattern of use.[16] Some NQF-endorsed measures may be influenced by the cost and quality of home health services but attribute results to the hospital. For example, the Medicare Spending per Beneficiary measure attributes costs for the three days prior to the index admission, during the index admission, and during the 30 days after hospital discharge. The costs would increase if a patient suffers a readmission—an event that could be driven by the quality of care that a home health agency delivers. However, the home health agency

may itself lack direct control, as the patient may have receive home health services for only a limited time.[15]

### Considerations for Pediatric Patients

In both commercial plans and Medicaid managed care plans, pediatric patients are increasingly included in alternative payment models and value-based purchasing programs.[22] Despite this expansion, the effects of pediatric value-based purchasing programs are not fully understood as compared to adult programs.[10] The unique nature of pediatrics raises attribution challenges. Pediatric care often focuses on acute care, healthy development, and emergencies rather than the management of chronic illness.[23] This different focus can result in the need to measure different outcomes for children and adults.

The role of family and community in managing a child's health can further complicate healthcare attribution. Children depend on adults to help them seek care, and the family plays a critical role in managing a child's health.[24] Furthermore, children may receive more care in nontraditional settings such as schools or day care then adults, making it hard to track cost and utilization.[25] Finally, healthcare utilization can vary widely among children, with a relatively small number of providers driving the majority of spending. The NQF Pediatrics Standing Committee highlighted the necessity of balancing the needs of the 20 percent of children with complex healthcare needs and their unique quality concerns with the majority of children.[22] As with adult patients, appropriate attribution may need to balance inclusiveness and driving changes with the locus of control of a provider, and the need for appropriate exclusions and risk adjustment. Additionally, a small number of patients drive the majority of spending, leading to small sample sizes that can undermine the reliability of a performance measure or attribution methodology.[17,26]

The attribution challenges driven by the nature of pediatric care may be confounded by differences in the payer mix for children. Medicaid is a key provider of health insurance for children, insuring 37 percent of American children.[10] However, some differences in the program design between Medicare and Medicaid can make it challenging to adopt successful Medicare attribution models for pediatric populations. Patients can enroll in Medicaid when facing a health crisis as the program is designed as a temporary safety net.[15] The ability to enroll at any time can cause a lack of stability in an attributed population. Additionally, Medicaid plans may ask families to select a primary care physician or will automatically assign a physician if one is not selected. However, this assignment may not align with the family's perception of their primary care provider or the child's usual source of care.

Commercial payers also play a crucial role in providing insurance to children. While children are frequently included in commercial alternative payment models, they are often not the focus of the design because of lower spending levels when compared to adults.[27]

**Table 1. Examples of How Pediatric Patients Are Attributed in Select Programs**

| Program | Payer Type | State | Attribution Methodology |
|---|---|---|---|
| Blue Cross Blue Shield MA Alternative Quality Contract | Commercial | MA | Beneficiaries are prospectively attributed to a PCP by designating their PCP at the beginning of each year.[28] |
| Partners for Kids | Medicaid Managed Care ACO | OH | Patients who have seen one or more primary care physicians are attributed to the physician who had the most visits in the past two years. Patients with no primary care visits were attributed to the physician assigned by Medicaid.[29] |
| Children's Hospitals and Clinics of Minnesota | Medicaid ACO | MN | Attribution to the ACO was defined as (1) being in a CHC health care home or (2) receiving a plurality of primary care at a CHC clinic. |

### Considerations for Cancer Patients

Cancer is the second leading cause of death in the United States and presents measurement challenges because of the complexity of the disease. Cancer encompasses numerous types and body systems with varying prognoses and treatment options.[30]

Additionally, oncology is often associated with high costs and can be a significant driver of healthcare expenditures.[31] The United States spends approximately $128 billion annually on cancer care—second only to cardiovascular disease. Additionally, the average costs for a patient with cancer range from $80,000-$110,000 compared to an average of $6,800 per person for all patients.[29] Measurement and value-based purchasing offer solutions to these concerns, but attributing cancer care can be challenging.

Cancer care is delivered in multiple settings (e.g., hospitals, outpatient clinics, ambulatory infusion centers, radiation oncology treatment centers, radiology departments, and palliative and hospice care facilities) as well as by multiple clinicians including surgeons, oncologists, nurses, pain management specialists, and social workers.[32] The involvement of numerous settings and clinicians can make it hard to know who was responsible for care and care outcomes. Complicating matters further is that care can be fragmented between these multiple providers.[33] Retrospective information about care received in

other settings can be limited, hindering a clinician's ability to understand how outcomes or costs are attributed. Clinicians can see information from the EHR but may not have access to information about how outcomes are assessed or charges are generated, which can be particularly challenging when patients require care from numerous clinicians and providers.

**Table 2. Examples of How Oncology Patients Are Attributed in Selected Programs**

| Program | Payer Type | State | Attribution Methodology |
|---|---|---|---|
| Oncology Care Model | Medicare FFS with commercial participation | Nationwide | The Oncology Care Model uses a plurality approach. First, the OCM identifies a cancer episode. Each episode is then attributed to the practice that provided the most evaluation and management (E&M) visits with a cancer diagnosis during the episode.[34] |
| Miami-Dade Accountable Oncology Program | Partnership between Blue Cross and Blue Shield of Florida (Florida Blue), and two providers, Baptist Health South Florida and Advanced Medical Specialists (AMS) | FL | Patient attribution is triggered by a diagnosis of one of six cancer types and three E&M visits in any 12-month period.[35] |

### Consideration for Complex and Vulnerable Patients

Patients who have complex medical needs can present unique attribution challenges. They may need to see a greater number of practitioners and may frequently cycle between inpatient facilities and their community. Additionally these patients may have confounding factors that affect their health and health outcomes that are not within the direct control of their healthcare provider. There is an increasing desire to include these patients in quality measurement efforts and value-based purchasing programs. However, across these diverse populations, various traits should be considered when attributing these patients: a greater number of diagnoses, the involvement of a greater number of practitioners and settings, the need for nonmedical care (i.e., outside of the healthcare system and not covered by health insurance) and the involvement of social determinants of health.

The inclusion of complex and/or vulnerable patients may hamper the ability of an attribution model to facilitate fair measurement. First, measure developers and program implementers must balance the

need to drive cost and quality improvements for these patients with what is feasible under an accountable unit's locus of control. Likewise, attribution models must also support the comparison of like groups to like groups. Given the multitude of challenges facing vulnerable populations, it may be difficult to risk-adjust to the point where one can compare one unit caring for a vulnerable population with another unit caring for a less vulnerable population. Those implementing attribution models may need to determine if traditional risk adjustment or peer group comparisons enable fairer comparisons.

However, excluding complex and vulnerable patients from attribution models could decrease the ability of value-based purchasing models and alternative payment models to improve costs and outcomes for these patients. While the preferred payment model and underlying attribution model may vary by the target population, measure developers and program implementers should consider the needs of the population, the goal of the program, and the need to ensure fair and accurate attribution.[36]

The examples below are intended to demonstrate potential challenges to attribution for complex and/or vulnerable patients. These examples do not comprise a comprehensive list or capture all potential vulnerable populations that should be considered when developing an attribution approach. Patients can have complex physical conditions as well as overlapping mental and cognitive disorders. Illnesses can be additionally compounded by social risk factors such as homelessness and housing instability, food insecurity, and other socioeconomic challenges. A patient may not be able to afford a medication and therefore is unable to take it as prescribed or may have a job that does not allow time off for a medical appointment. Many patients with complex conditions or social risk factors could benefit from community supports and nonclinical interventions; however these interventions are not reimbursed by traditional payment models. Furthermore, data on social risk factors and nonmedical care may not be available to support attribution models. These examples highlight potential issues to consider as measure developers and program implementers evaluate attribution choices.

#### EXAMPLE 1: PATIENTS WITH MULTIPLE CHRONIC CONDITIONS

A chronic condition is one that lasts one or more years and requires ongoing medical care and/or limits a person's ability to perform activities of daily living. These can include physical conditions as well as mental and cognitive disorders. A person with multiple chronic conditions is afflicted with two or more chronic conditions at the same time. Over 25 percent of Americans have multiple chronic conditions, and that number is expected to rise as the population continues to age.[37] Multiple chronic conditions are a key driver of healthcare spending; 66 percent of the total healthcare spending is associated with care for these patients.[38] These patients are more like to see a higher number of clinicians and take multiple medications, and they are more likely to receive care that is fragmented and are more at risk for adverse outcomes.

Nonclinical interventions and social services have been shown to improve outcomes and reduce expenditures for patients with multiple chronic conditions These services are also not reimbursed under traditional payment models, which potentially limits their availability and the ability of clinicians to connect patients with needed nonmedical supports.[36] Social risk factors can further complicate attribution for patients with multiple chronic conditions. Having multiple chronic conditions can

interfere with a person's functional status and ability to work and hold a job—factors that can influence issues like their ability to comply with treatment plans and the social supports they have available.

Given the high cost of treating multiple chronic conditions, payers have some desire to include these patients in value-based purchasing programs and alternative payment models. Expanding coverage of nonmedical supports could help to support clinicians and providers managing these patients.[36] Stratification to allow comparisons for patients with multiple chronic conditions could also lead to improved attribution models.[39] Additionally, the Bipartisan Policy Center found that attribution methodologies should allow accountable care organizations to have a more stable panel of beneficiaries to support the transition to risk sharing.[40]

#### EXAMPLE 2: PATIENTS WITH SUBSTANCE USE DISORDERS

Most value-based purchasing programs address physical health. However, there is growing interest in including behavioral health in payment reform efforts, particularly for Medicaid, as the program is the largest payer for behavioral health services, and spending for beneficiaries with a behavioral health diagnosis is substantially higher than for those without one.[41] Moreover, the deadly opioid epidemic has increased focus on the need to support better care for substance use disorders. The Medicaid Innovation Accelerator Program identified substance use as a key area to leverage delivery system reform to drive improvements.[40]

Accurate attribution will be essential to leveraging quality measurement and value-based purchasing to improve care for substance use. However, certain challenges should be considered when determining how to attribute patients with a substance use disorder. First, it can be challenging to develop outcome measures in this area as care focuses on the achievement of patient goals, rather than quantifiable medical outcomes.[42] Additionally, the nature of the disorder, access challenges, and the need for nonmedical supports can make it challenging to hold one provider responsible. The influence of both social risk factors and clinical co-morbidities could make adequate risk adjustment difficult. Finally, limits on data sharing due to confidentiality regulations (42 CFR Part 2) can affect accurate attribution.

#### EXAMPLE 3: PATIENTS WITH DISABILITIES

In all states, Medicaid provides coverage for people with disabilities. People under age 65 who qualify for Medicaid on the basis of a disability include adults and children with disabilities that they have had since birth and others who have disabling conditions resulting from illness, injury, or trauma. Medicaid beneficiaries enrolled through disability pathways include those with physical conditions (i.e., quadriplegia, traumatic brain injuries); intellectual or developmental disabilities (i.e., cerebral palsy, autism, Down syndrome); and serious behavioral disorders or mental illness (i.e., schizophrenia or bipolar disorder).[16] States are increasingly looking to alternative payment models to improve quality and reduce spending for Medicaid patients, but such models depend on accurate attribution.[43]

#### EXAMPLE 4: MEDICARE/MEDICAID DUAL ELIGIBLE BENEFICIARIES

Medicare/Medicaid dual eligible beneficiaries are a vulnerable and potentially high-cost population who may face complex medical, social, and behavioral challenges and who tend to have higher per capita healthcare costs.[35] Additionally, dual eligible beneficiaries may have needs that span primary, acute, and

chronic care and may need behavioral health, long-term services and supports, and other social supports as well as medical care. These factors can make it challenging to understand who had a reasonable degree of control over a person's care. Compounding this challenge can be the impact of social determinants of health on a person's outcomes. Challenges can also arise from the additional complexity resulting from this population being covered by two payers. The fragmented payment methodologies and potentially differing attribution models can hinder efforts to improve quality and costs.[8] Attribution methodologies could vary depending on how the patient's benefits are administered and participation in payment reform efforts under each program.

Responses from key informant interviewees—particularly from the stakeholders who are learning how to mitigate and address attribution challenges on a day-to-day basis—confirmed the findings of the literature review of the key challenges with special populations. The respondents also highlighted some strategies currently being employed to care for these patients and ensure they are attributed fairly and accurately. One of the primary strategies mentioned by multiple informants was the use of the Medicare Annual Wellness Visit (AWV) as a mechanism for identifying patients for outreach, establishing a primary care provider relationship and medical home, and thereby ensuring attribution of otherwise nonattributed patients to a primary care provider. The AWV enables the identification of current chronic and acute conditions, healthcare needs, and potential complications. For complex and vulnerable patients, identifying these issues not only helps to identify an accurate risk score through the coding of the visit, but enables the provider to address any potential complications proactively with the appropriate treatment, screening, and referrals.

### *How does the model address team-based care?*

The transition of care delivery from a physician only-led model to a team-based model has increasingly become the trend as primary care practices and other settings have expanded the scope of care to better meet their patients' needs for healthcare services beyond a 20-minute appointment with their physician. Practices are increasingly offering services such as mental health, social support, health education, and case management provided by an extended team of practitioners with unique expertise. Soon after the rollout of the Affordable Care Act, when access to primary care providers was extended to many who previously were not consumers in the healthcare system, it became increasingly necessary for many practices to change the infrastructure of how care was delivered in order to make care more accessible for patients. The patient-centered medical home model, for example, provided a standard for practices for accessibility and availability of expanded services. In order to do improve the availability of services, patients gained access to care through nurse practitioners, physician assistants, pharmacists, and a host of other practitioners based on patient needs.

This transition poses a host of challenges in an environment where performance measurement is tied to incentives and penalties. While a team-based care delivery model can be more effective at meeting the multifaceted healthcare needs of a patient, it can make assigning accountability for that patient's outcomes difficult. Questions arise around whether a single practitioner should be held accountable in order to drive improvement amongst a team or whether to distribute accountability proportionally amongst the team based on levels of intervention with the patient (e.g., number of claims, dollars

associated with claims/care delivered). Further, depending on the setting and episode, a team of practitioners may be more accurately defined as multiple accountable entities whose relationship to each other and the patient is transient.

The attribution principles established by NQF's Panel on this topic suggested that attribution models should reflect what the accountable entities are able to influence rather than directly control. However, there is a lack of guidance and evidence to support how to determine the proportion of care or outcomes attributed to each provider, and further, how to proportionately reward or penalize them. More practical challenges lie in how performance results are shared and distributed to team members and the perception of accountability and responsibility for improving results among team members. When performance data are distributed only to one person on the team, this person can be perceived as the practitioner solely responsible for improving results.[44] While the perception is that care is provided by a team, the efforts to improve may be blunted by a lack of buy-in or ownership of responsibility by the other team members. When attribution does not accurately reflect the patient-practitioner relationship, the practitioner may not be motivated to take action to improve or assume that someone else on the team is responsible for taking action. Getting the team dynamic wrong in this context can ultimately lead to unintended consequences. These consequences may include the patient receiving less than optimal care or experiencing poorer outcomes. Unintended effects may also include the introduction of selection bias and unnecessary risk for practitioners.

Another challenge encountered with reflecting team-based care in performance measures has been identifying an accountable entity for an episode of care that spans multiple settings. When each setting has meaningful impact on the patient's outcomes within an episode, but only one setting (or team/provider) is held accountable, this also leads to a perception that not all accountable entities have enough influence over the episode to meaningfully improve results.

Key informant interviews reflected these challenges when respondents also pointed to the challenges of attribution in academic institutions where medical students, residents, attending physicians, and hospitalists may be involved in a patient's care. While a team-based attribution approach would be fitting in this setting, the transience of the team's composition makes continuity of performance improvement and ownership of responsibility difficult.

### Considerations for Building a Team-based Model

Despite the various challenges associated with attributing care and outcomes to a team or more than one provider, efforts to explore and implement this type of attribution approach are growing with the changing delivery system. Several key considerations emerged through the Advisory Panel's discussions to guide users when employing such an approach. Any team-based attribution model design should reflect these considerations within the context of the episode and application of the model:

1. Identify the outcome of interest
2. Define the team or identify the multiple accountable entities within the episode of care
3. Determine who on the team has influence on the care delivered and patient outcomes
4. Determine who on the team gets responsibility and for which portions of the care and outcomes

#### IDENTIFYING THE OUTCOME OF INTEREST

Identifying the outcome of interest is an imperative step in determining influence of the team. While teams may be composed of many types of practitioners (e.g., hospitalist, PA, NP, and surgeon), based on the outcome selected, the influence of specific providers for a particular outcome may vary greatly.

#### DEFINING THE TEAM

Perhaps the most important step is to explicitly define how the team will be identified in the approach. In a primary care setting, the team may be more obvious in that there is a stable setting in which the same set of providers consistently work together to manage a panel of patients. In this context, the providers work together closely, use the same EMR, communicate on a regular basis, and may interchangeably see the same set of patients. Based on the episode of care, a team of providers may be more accurately described as multiple accountable entities. Providers each interact with a patient in some way during the episode of care; however, a providers have no consistent or meaningful contact to coordinate a patient's care, do not share EMRs, and do not even know each other. This may be more common with episodes of care that cross settings (e.g., hospitalist to home care provider).

#### DETERMINING INFLUENCE

Influence should be considered in the context of the outcome of interest, the relationship between the provider and patient, and the scope of practice of the practitioner. Keep in mind that claims data may not always be the most effective tool in defining relationships between providers and patients. Claims data may not reflect the involvement of a team member who cannot bill. Many states vary in the scope of practice for nurse practitioners and their ability to practice and bill independently. Even in the states where full practice authority has not been granted, the nurse practitioner may be an active and even primary member of a care team but the data do not reflect this.

#### SPECIFYING RESPONSIBILITY

Those implementing attribution models through measures or programs have developed multiple approaches for reflecting team-based care in attribution approaches; however, there is no guidance or standards on which approaches are most effective at ensuring accountability is appropriately and fairly distributed amongst the various practitioners involved in a patient's care or their outcomes. Several approaches to team-based attribution are discussed below including the trade-offs that should be considered during implementation:

- Attribute the episode of care to the "team leader" or a "primary" provider in the episode. It is assumed that this person will be responsible for coordinating distribution of the performance results and coordinate any necessary improvements.
- Divide responsibility across team members. Most often this is done proportionally across each team member (e.g., three team members are each attributed one-third of the responsibility)
- Each member of the team is assigned total (or equal) responsibility for the episode.
- Assign responsibility at the group level, rather than the individual practitioner level.

**Assignment to a primary entity within a team of providers.** For some NQF-endorsed measures attributed at the hospital level, the hospital is assigned accountability for unplanned readmissions to the hospital from a skilled nursing facility (SNF). The "team" in this context is multiple accountable providers (potentially affiliated with different healthcare organizations) across settings. When initially proposed

and considered in the NQF endorsement process, this approach was considered aspirational and controversial, with little evidence to support its appropriateness. While it was agreed that the hospital could meaningfully affect a patient's unplanned readmissions outcomes, many questioned whether the hospital team could reasonably influence care provided while in an SNF—especially whether responsibility across the episode of care should be shifted from the hospital to the SNF after discharge. Some argued that the hospital team could either directly or indirectly—through collaboration with partners whom they can reliably influence—ensure that the facilities to which it is discharging patients meet the hospital's standards to reduce readmissions. The impact of this aspirational approach would need to further examination once the measure was implemented. Furthermore, the hospital team, including an acute care physician, nurse practitioner, or social worker, may take accountability for this outcome by following up with patients and providers while the patients are in the SNF to ensure delivery of appropriate care.[45]

**Distributing accountability based on dollars** (i.e., claims-based aggregation of amount paid for billed services). This approach relies on distribution of accountability amongst the practitioners involved in the patient's care based on the dollars associated with the care they provided. The dollars are commonly determined by assessing the claims data and dividing the total cost of the episode of care amongst the team members associated with the claims submitted for that episode. In some approaches, the team member with the highest proportional dollar amount associated with their care is assigned primary responsibility. While this approach does offer the advantage of providing more concrete data to support attribution decisions, it also has the strong potential for biasing the perception of proportional responsibility and an overwhelming shift of primary responsibility to specialists for whom care is more costly. Further, due to limitations in claims data, claims may not capture some services provided by some practitioners.

**Assigning accountability at the group level.** Team-based attribution in the primary care setting offers the benefit of having a stable set of team members who collaborate on a relatively stable group of patients who receive care at the same practice location or within the same provider group. Assigning accountability at the group level enables the aggregation of data at higher levels and improves stability and reliability of performance results. This level of attribution also allows one to drill down to the individual practitioner in order to address individual provider performance and practitioner-specific improvement efforts within the organization and facilitates team-oriented approaches to performance improvement.

**Episodic team-based attribution.** Accountability for the episode is shared across the providers proportionately based on an assessment of the number and type of claims and the practitioner's role within the episode. For example, a patient may see a primary care physician as well as a cardiologist to manage his congestive heart failure but also needs a hip replacement. Rather than attribute potentially unrelated outcomes and expenses to the primary care physician or cardiologist, an attribution model could attempt to group by diagnosis and assign each team member responsibility for the care he or she provided. If done adequately, this approach has the advantage of getting buy-in from those on the team whose level of responsibility for the episode can be linked to provider-specific clinical activities. On the other hand, this approach faces similar data challenges as with other attribution approaches in that it

might often require more than administrative data to accurately determine the clinical activities and extent of involvement in a patient's care.

## Evaluation Consideration 2: How has the model been tested?

In prior work, NQF called for testing attribution models to ensure goodness of fit, scientific rigor, and ensure that any unintended consequences are mitigated. Transparent, clearly articulated, reproducible methods of attribution are needed, as research demonstrates that different attribution rules can influence how an accountable entity may perform in an accountability program.[17,46]

When examining how testing was conducted through the use cases, it was clear that additional guidance is needed on how testing of an attribution model should be determined. Since the initial work in this area, limited additional guidance or empirical work on testing attribution models has emerged. Given the number and variation of attribution methodologies that can be employed and how the methodology selected can influence results, attribution models must be tested to ensure they are valid.[45,47]

### *What is the relationship between the evidence and the testing of the model?*

When the NQF Attribution Model Selection Guide was examined, it became clear that additional guidance is needed to distinguish the goals of evidence and testing of an attribution model. The Panel generally agreed that the goal of reviewing evidence used to support an attribution model is to demonstrate that a provider can reasonably influence the outcomes. Multistakeholder review of the conceptual rationale for the influence of the accountable unit upon the outcome can evaluate the reasonableness of the influence of the accountable unit. This influence often heavily depends on the context in which the attribution model is being used. In contrast, the goal of testing is to determine the effectiveness of the attribution model to approximate the patient and provider relationship. Thus, for each measured outcome, testing should quantify the patient and provider interactions, and the evidence should conceptually evaluate whether those interactions can have a meaningful impact on the outcome being measured. The Panel further clarified that testing of the attribution model should be done through both the performance measure specifications and the program. The Panel recognized that the concepts of the reasonableness of influencing outcomes and approximating the patient provider relationship are related, but each should be examined carefully.

### *How were the scientific properties of the model assessed?*

At the measure level, reliability and validity can be assessed once the measure is passed through the attribution model. The attribution model at the measure level identifies the individual patients who will be included in the denominator of the measure, the accountable unit, and the data used to determine the provider and patient relationship. Specifically, the source of the data used, the length of time, and the age of the data are critical to understanding the provider and patient relationship. At the program level, the attribution model depends on the time period selected, and the data or services used to identify patients and their associated providers.

#### Sensitivity of the Attribution Model Parameters

Exploring the sensitivity of the attribution parameters can identify variability and may provide insight into possible limitations in the methodology.[48] In the first attribution report, the Committee

recommended testing multiple attribution methodologies to see the changes in the attributed population, and the Attribution Model Selection Guide asks if multiple methodologies have been considered. The Panel noted a need to understand the consistency or variation across approaches.

The Panel also discussed the potential for evidence generated by empirical testing. The Panel indicated that measure developers or program implementers should consider multiple attribution models and consider what the outcome may look like under different attribution rules. Panel members expressed a need to understand which patients would be covered under different rules. Sensitivity testing of the parameters may include testing the included patient population across methods, risk scores, and measure scores for a provider across multiple attribution model approaches. Highlighting the differences from testing the attribution parameters can help inform conversations and decisions about which is the best attribution model specification. Finally, there is a role for a qualitative explanation of model selection, such as consequences or drive for change to supplement stakeholder input or empirical testing.

#### Validity

The goal of validity testing of an attribution model through a performance measure specification is to assess the effectiveness of the attribution model to approximate the patient and provider relationship. Retrospective models attempt to determine a historic relationship and how a person's care was delivered. Chart review may be the most valued standard of data-derived options to determine the patient/provider relationship; however, testing a model this way may not always be feasible. In NQF's first attribution report, it noted the potential need for an adjudication process to challenge the results of an attribution model. For prospective models, there is potential value in patient and clinician attestation as a way of validating the results of an attribution model. Alternatively, multistakeholder input to ensure the face validity of a model may be the most feasible way to test the validity of an attribution model. The Panel acknowledged there may be tension between the desire to include larger numbers of patients and validity. To achieve larger numbers, a model may need to include patients whose care is provided or influenced by a number of practitioners, rather than being solely in the control of one accountable unit.

### Evaluation Consideration 3: What data were used to support the attribution model?

Data play an essential role in the implementation of an attribution model. Available data sources and data quality should be considered when designing and selecting an attribution model. Claims data are more accessible, less susceptible to gaming, and readily available making them an easy choice and the most frequently used. Claims data also present challenges with accurately addressing disease severity for many conditions because they lack clinical granularity and are not designed to capture many clinical processes which may be important to determine accurate attribution. However, other data sources should be considered when designing an attribution approach, which may lead to more accurate associations between patients and providers. Other types of data that should be considered include prospective patient-defined relationships, data from electronic health records as well as both patient and clinician attestation of relationships. Considering multiple data sources for the most comprehensive assessment of provider-patient relationship has significant advantages, but can also present challenges

related to the feasibility of data collection in terms of volume of data and the potential to develop additional processes outside of the normal care delivery process to collect these data. Further, not all members of the healthcare team are capable of capturing their activities with the patient using claims data and may be excluded from analysis or the opportunity to be included in the team associated with the patient's care and outcomes.

Respondents from the key informant interviews also identified several practical challenges in ensuring accurate attribution based on available data. Coding practices continue challenge many institutions for ensuring accurate performance data. For attribution purposes, when visits and corresponding codes are incorrectly billed to a particular provider in a group practice, this can cause downstream inaccuracies with attribution. While the use of EHR data is an attractive option for clarifying and filling the gaps of administrative data, EHRs pose challenges with the way data are stored. For example, records and data that have been scanned into the chart as an attached file to the record are often not searchable as is information typed into free text fields rather than structured data fields.

The development of CMS' patient relationship codes and categories required by MACRA has the potential to further identify the patient-provider relationship. These codes were created in order to better facilitate the attribution of costs and services for claims reported in the Cost Performance Category of the MIPS program. Using these codes in the Cost Performance Category, CMS has determined results within the category will account for 30 percent of the MIPS score by the 2019 performance period. While these codes offer promise, some limitations still constrain their implementation; specifically, the codes are intended to remain broad but also capture the specificity and various types of services provided by the specialties and enable the distinction of meaningful differences between them.

Increased use of the National Provider Identifier in research may help to identify opportunities to improve data quality. The integration of registry data can harvest the potential of clinical data to identify patient-provider relationships and drive improvement for pre-identified outcomes. Finally, EHR data can be leveraged to develop attribution models using statistical models that identify a physician's primary patients.[8,49] Expanding the use of these data will help to also expand our understanding of the validity and integrity of these data sources.

The data challenges present in attribution inherently link to the data challenges with performance measures. First, data can be siloed by setting and not available to all applicable parities. For example, attribution approaches focused on attributing care for a chronic condition that spanned multiple settings may present challenges in integrating data collected in a hospital and an SNF. Additionally, pharmacy data, which are often collected by a separate organization and carved out from commercial plans, pose a challenge in access and with linking such data with other measure or patient-level data. Alternatively, more innovative attribution models seeking to integrate the patient's identification of relationship and use attestation of the patient and/or the provider to confirm the patient-provider relationship may face challenges resulting from differing opinions of the patients and their providers. The patient identification of a PCP can conflict with the provider attestation or validation of this relationship. More practical challenges with data integrity relate to the timeliness and availability of

the data to the attributable entities such that these data enable timely improvements to practice patterns.

## Evaluation Consideration 4: Does the model align with the context of its use?

Attribution models should be designed and used in the specific program context for which they are intended. They should take into account the program goal, whether the program is mandatory or voluntary, the accountability mechanism used (e.g., payment or public reporting), and the intended behavior change.[50] There is a need to balance the aspirational goals of an attribution model with the evidence base of the influence an accountable unit has over the outcome measured. If the goal is significant transformation of the delivery system, it is important to engage in multistakeholder review of attribution models to ensure successful participation of accountability entities. Given the limited evidence to support the selection of one attribution model over another, stakeholder input is essential to ensure buy-in and transparency. For example, Minnesota Community Measurement is developing a community standard for attribution for primary and specialty care to support delivery system goals, bringing in accountable entities into the design and/or evaluation process for the attribution model.

Alignment of the program and measure inclusion criteria and target populations is critical to ensure that proper financial and quality incentives are created. When selecting a performance measure for a bundled payment program based on episodes of care, the target population for the program must be represented in the performance measure inclusion criteria. Quality performance measures help to monitor negative unintended consequences from financial incentives to reduce or skimp on needed care for patients. However, if the population included in the payment program is not represented in the quality measures, the measures will not monitor quality for all patients included in the program.

Attribution models could be improved by ensuring alignment between the accountable entity and the outcomes for which that entity is held responsible. For example, current models could hold a hospitalist accountable for admission rates even though that clinician was not involved in a patient's care in the community and had not interacted with a patient prior to admission. Similarly, some models may hold a doctor in the community responsible for the costs and outcomes of care performed in the hospital, even though data are not shared between the hospital and the physician practice.

### *Distinguish Between Program-Level and Measure-Level Attribution*

In the prior NQF Attribution project, the Committee noted that attribution can refer to both the attribution of patients to an accountable unit for accountability purposes, such as a value-based purchasing program or regulatory requirements, as well as the attribution of results of a performance measure, such as health outcomes or resource use, to an accountable unit. In this project, the Advisory Panel sought to further clarify the distinction and interaction between program-level and measure-level attribution.

Program level attribution outlines the rules for assigning patients to the accountability program. For example, a program-level attribution rule can determine how patients are attributed to an Accountable Care Organization (ACO) in the Medicare Shared Savings Program. In the case of the Shared Savings Program, the attribution rule is defined in regulation, vetted with stakeholders via public commenting,

and implemented. The Advisory Panel agreed that when designing this type of attribution model, the Attribution Model Selection Guide can help outline important elements that should be defined and made transparent. Multistakeholder review has not traditionally had a role in this type of program-level attribution model evaluation. A structured multistakeholder review using the Attribution Model Selection Guide enhances a public commenting process by allowing for objective examination and vetting of the potential considerations from and between stakeholder groups. This review also helps to increase transparency of the attribution model through an examination and public vetting, and an opportunity to reach consensus among stakeholder groups prior to deploying an attribution model into the field.

In contrast to program-level attribution, measure-level attribution models generally run through the measure specifications. The Attribution Model Selection Guide includes a number of items addressing measure specifications such as qualifying events for inclusion in the measures, exclusion criteria, and the risk adjustment model. The Guide also asks a number of key questions about the performance of a measure including sufficient sample size and overall measure reliability performance. These elements are currently examined during the NQF endorsement process for a specific level of analysis (i.e., individual provider, group practice, facility, etc.). While the NQF endorsement process currently evaluates several of the elements of the Attribution Model Selection Guide, it does not specifically draw out the measure's attribution approach for evaluation. Future work should consider how a measure-level attribution evaluation can examine if the appropriate patients are attributed to the appropriate providers. This can be done by running through each of the elements of the Attribution Model Selection Guide for a measure and its intended application. This type of evaluation is particularly important for measure attribution to smaller groups of providers and individual clinicians.

### Evaluation Consideration 5: Have potential unintended consequences of the model been explored and have negative consequences been mitigated?

Measure implementers should be aware that the attribution model selected will drive consequences, both intended and unintended. Improperly designed attribution models carry a risk of negative unintended consequences to patients. Attribution models should not diminish access to care or detract from the patient-centeredness of care.[51] Models should attribute as many patients as possible to ensure that patients are having their needs met and receiving coordinated care and to improve the reliability of attribution models. However, attribution models should not interfere with patient choice or prevent patients from receiving care they need.

There is a need to weigh potential improvement against potential negative consequences. Flawed attribution approaches can have unintended consequences for the patients by limiting access for complex and vulnerable patients with multiple co-occurring conditions. These patients are precisely the patients for whom attribution is most important given the multitude of conditions present and the importance of coordination.

Further, flawed attribution approaches can have serious unintended consequences for the accountable unit. An inaccurate attribution model may assign a patient to an accountable unit that does not have influence over his care, potentially leading to unchecked poor performance or patient outcomes.[17]

Attribution models that assign incorrect results can cause high performers not to receive the scores they deserve, leading to demoralization, burnout, and a lack of confidence in measure results, and potentially undermining the relevance of the performance measurement enterprise. Misattribution can have significant impact on accountable entities, as high-stakes consequences may include publicly reported data based on a flawed attribution model, posing reputational risk and even resulting in payment adjustments.

Ryan et al. found the majority of attribution models assign responsibility to a primary care physician.[17] In NQF's prior report, the Committee noted the challenges that attribution may present for specialty care. Attribution models that assign accountability to a primary care physician can influence referral patterns. While this may help achieve the desired goals of cost containment and care coordination, such models can have potential negative consequences for specialists. Mehta and Macklis noted that specialists may fear the loss of control of care for their patients.[30] Other models may attribute the patient to a specialist if he or she is the clinician who billed the majority of visits, but models that attribute to a specialist based on plurality of visits can skew results. In these models, a specialist may be measured and have results reported for outcomes and expenditures unrelated to the care he or she provided.

Attribution models can also have consequences for the healthcare system broadly. Providers may wish to gain more control over patient care they are held accountable for or may wish to avoid shared attribution. These desires can lead to market consolidation as providers feel forced to merge to protect themselves from the consequences of misattribution. These mergers could result in a possible decrease in care quality and access over the long run. Safeguards in attribution models can include exclusion criteria or risk adjustment for high-risk or complex patients.

## Evaluation Consideration 6: Is the model transparent to all stakeholders?

NQF's first report emphasized the need for transparency of attribution models. Stakeholders have observed that details of attribution model algorithms currently are not available to all affected parties. This lack of transparency makes it difficult to understand the results of the model and for accountable entities to improve their performance. Insufficient transparency also prevents patients from knowing who is held accountable for their care and can prevent them from being empowered consumers. As part of a multistakeholder review, the details of the algorithm should be made available. NQF's first report on attribution also noted the need for attribution models to be implemented with an adjudication process. The opportunity to appeal potentially inaccurate results would help to ensure buy-in and foster greater confidence in the results.

Users of attribution models may choose from among potential strategies to increase the transparency of attribution models. First, all specifications for the attribution model outlined in the Attribution Model Selection Guide should be shared with the entity being measured. Currently, clinicians and providers have limited details about how results are attributed to them, leaving them unable to make meaningful improvements or forcing costly efforts to recreate results. Additional strategies may depend on the specific attribution strategy uses. Prospective models may inherently be more transparent but could be improved by proving accountable entities with periodic updates on their performance. Retrospective models could be made more transparent by allowing for the opportunity for meaningful adjudication.

However, the implementation of an adjudication process should be balanced with concerns about maintaining patient-centeredness and the concern that accountable entities will only appeal cases with unfavorable results.

## Improving the Attribution Model Selection Guide

Input from the use cases and surveys was used to identify potential ways to improve the Attribution Model Selection guide. These reviews identified areas where additional guidance was needed from the Panel and where the guide could be refined to improve its usability. Measure developers agreed that the questions in the guide are useful but requested more concrete guidance about which attribution choices may be appropriate in a given situation. Developers indicated the need for additional support and input on potential best practices when creating their attribution models. Benchmarks and example answers were suggested as guidance that would be helpful to developers. Overall, respondents supported the question-led format but noted the need for additional clarifications. Developers suggested that the questions could be simplified and may be redundant of one another and of questions in NQF's endorsement submission process. Developers also requested questions that can be adjudicated from a quantifiable result and provide additional guidance on what to do for "edge cases" that could go either way in an attribution model.

Tables 1E and 2E in Appendix E summarize the themes of the survey responses and use case analysis.

### Recommendations for Improving the Selection Guide, its Dissemination, and Use

Other stakeholders who make decisions about attribution within their organizations, including public and private sector payers and purchasers, need guidance. Through the Attribution Model Selection Guide, the Committee laid out the minimum elements of an attribution model that model developers should consider and make transparent to all stakeholders. Increasing the dissemination and use of the Guide could help to facilitate a multistakeholder dialogue.

In addition to standard methods for dissemination of NQF products through its website and publications, NQF will seek to increase uptake and use of the Guide through its incorporation into the NQF measure submission and selection processes. By integrating the use of this product in Committee evaluation and selection processes, as well as in reference materials used by developers for the submission of measure specifications, the use of the Guide will become mainstream to those involved in NQF work.

In future iterations of this work, NQF proposes the following steps for improving the Attribution Model Selection Guide. These recommendations are based on feedback from the survey, Advisory Panel discussions, and key informant interviews.

1. Divide the current guide into two products:
    a. A guide for specifying and designing an attribution model, and
    b. A guide for evaluating an attribution model.
2. The attribution evaluation guide should incorporate algorithms for determining appropriate decisions made in the design of the model based on its use.

3. The attribution specification guide should provide examples of responses to the required elements and algorithms to assist with design decision points in designing a model.
4. The guide should include more real world examples and highlight potential attribution decisions for specific situations.
5. Clarify the following questions in the current guide in the context of the evaluation or specification of attribution models:
    a. Elucidate terms such as “multiple units”
    b. Reduce potential overlap between questions
    c. Address potential redundancies with NQF’s measure submission form
6. Explore automated, online, and other electronic options to make the form easier to use

## Path Forward

Attribution remains an understudied aspect of measurement science and delivery system reform. The evidence base to support the choice of one model over another remains limited. Similarly, methods to test an attribution model have not been established. In light of the lack of evidence and challenges to testing, stakeholders have stressed the importance of gaining input and support before implementing an attribution model. This second report builds on the previous guidance of the NQF Attribution Committee that developed NQF’s first attribution report. NQF’s first report outlined a series of Principles and recommendations, and created the Attribution Model Selection Guide. By providing additional guidance on the evidence for, testing of, and selection of an attribution model, this report lays the groundwork to implement attribution into NQF’s work. Currently, NQF processes do not explicitly address attribution. However, opportunities exist to build on current processes to allow for multistakeholder review of attribution models.

### Evaluation of Attribution Model as Part of Measure Endorsement and Selection

NQF’s current process for evaluating measures for endorsement includes an assessment of the attribution approach within the evaluation of reliability and validity in cases where attribution is specified as part of the measure. The current evaluation criteria, however, lack guidance or specific criteria on how to perform a focused, systematic review or evaluation specific to the attribution approach. This has presented challenges, specifically for cost and resource use, population health, and readmission measures, where the attribution approach and measure specifications intertwine, and the use of the measure is anticipated for accountability or payment purposes. With these challenges in mind and to better meet the needs of expert Committee members evaluating measures and those using NQF-endorsed measures, including criteria for the evaluation of attribution models would enhance the NQF evaluation criteria. Prior to implementing this enhancement to the criteria, guidance for testing requirements and identification of required submission items specific to the attribution approach would need to be specified and communicated to those submitting measures. This guidance would be developed in alignment with the elements of the Attribution Model Selection Guide and increase uptake and dissemination of the Guide which would support the preparation of submissions for multistakeholder evaluation.

In addition to endorsing performance measures, NQF convenes the Measure Applications Partnership to provide guidance on the selection of performance measures for federal quality initiatives. Similar to the endorsement process, the alignment of a measure's attribution model and attribution approach within the program for which it is recommended is not specifically considered in the MAP Measure Selection Criteria or highlighted in the preliminary analysis algorithm conducted on each measure under consideration. The Measure Selection Criteria and preliminary analysis algorithm could be revised to consider explicitly the attribution of a performance measure in light of its potential use and the attribution model of the program.

## Conclusion

Healthcare outcomes are influenced by numerous factors: a patient's health status, clinical and social factors, and the quality and effectiveness of healthcare services, treatments, and interventions that may be delivered by numerous clinicians and other providers in numerous settings and over varying lengths of time. Using measures of healthcare outcomes involves a series of decisions about who to hold accountable and how to determine responsibility. First, a measure developer or program implementer must determine conceptually which providers could influence healthcare outcomes or expenditures. Then a developer or program implementer must develop an attribution model that uses pre-specified rules to determine responsibility and support that conceptual model for accountability.

Accurate and fair attribution is essential to the success of efforts to reform healthcare payments and improve quality. Attribution models must be credible for measurement to succeed: clinicians and other providers should be held accountable for outcomes and expenditures that they can influence, so they will believe in the results and act on them to drive progress. However, there is also a role for aspirational attribution models. Attribution can serve as a powerful tool to promote person-centered care and ensure that someone is taking responsibility for a patient and that patient's outcomes.

Private payers, Medicare, and Medicaid have all expressed a commitment to transitioning away from fee-for-service payment. As the healthcare system increasingly depends on performance measurement, value-based purchasing, and alternative payment models, attribution will continue to be essential to drive improvement. Without accurate attribution, providers to improve their cost and quality outcomes and for patients to know who is accountable for their care.

Currently there is no universal standard for attribution, and the evidence base and testing methods to support a model remain limited. Rather, a measure developer or program implementer must consider a goal and determine which units to hold accountable and what mechanism to use to determine accountability. Different choices can lead to different units being held accountable. The influence of these choices necessitates input from all stakeholders and transparent algorithms that have buy-in from all parties. By incorporating attribution considerations in NQF's evaluation processes, stakeholders could have a better understanding of which entities will be accountable and determine if they can meaningfully influence results. This input can ensure fair and accurate attribution to support both performance measurement and value-based purchasing.

Improved attribution will ensure that value-based purchasing and quality measurement are able to achieve their full potential to improve the healthcare system. Inaccurate attribution threatens confidence in results, and the current lack of transparency can lead to concerns about how attribution models are developed. The implementation of a multistakeholder review process for attribution models could alleviate these concerns by ensuring that providers have greater confidence in their results and by providing better information to consumers about who is considered responsible for their care.

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## Appendix A: Advisory Panel and NQF Staff

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## Appendix B: Definitions and Terminology

- Attribution: pre-specified rules that determine the specific patients, types of health care services, and duration of care for which providers and organizations are responsible. Include considerations by care setting.
- Aggregation: the combination of units at a lower level (e.g. individual provider) to a higher level (e.g. provider organization).
- Allocation: The division of a performance indicator across different health care providers. For instance, 60 percent of health care spending may be allocated to Provider A and 40 percent is allocated to Provider B.
- Quality of care: This report will define quality broadly, based on a modified version of Institute of Medicine's aims for health care: safety, timeliness, effectiveness, equity, and patient-centeredness.
- Health care cost or resource use: Measures of health care utilization. Distinguished from measures of spending through the use of standardized prices or counts of utilization.
- Health care spending: Measures total health care spending, including total resource use and unit price(s), by payer or consumer, for a health care service or group of health care services associated with a specified patient population, time period, and unit(s) of clinical accountability (e.g. clinician, hospital, ACO).
- Providers: denotes clinicians without regard to degree (e.g. registered nurses, licensed practical nurse, primary care physician, specialist physician, hospitals, post-acute care facilities, etc.). Include distinction between individuals and institutions.

## Appendix C: Summary of Prior Work

In 2016, NQF, with funding from the Department of Health and Human Services (HHS), convened a multistakeholder Committee to provide guidance to the field on selecting and implementing attribution models. The final output of this work was the *Attribution: Principles and Approaches Report,* which reviewed current attribution models, defined guiding principles for attribution, developed the Attribution Model Selection Guide for measure developers and program implementers, and put forward a set of recommendations for the field.

In addition to the work done by the Committee, NQF commissioned an environmental scan and white paper to further explore attribution models that are in use or have been proposed for use in literature. Key findings from the commissioned paper included:

- There are over 170 attribution models with significant variability across models. Models varied by use of elements such as prospective/retrospective attribution, eligible provider, timeframe, use of an episode of care vs acute/chronic care, exclusivity, use of majority or plurality, and measure for eligibility (visits vs spending).
- The quality measurement field has not yet determined best practices for attribution models, and many existing models are largely based on approaches previously used.
- There are trade-offs in the development of attribution models that should be explored and made transparent. For example, prospective attribution allows providers to know the patients in the panel while retrospective attribution may provide a more accurate reflection of the care provided.

In response to the commissioned paper, the Committee developed guiding principles, recommendations, and the Attribution Model Selection Guide. The goal of these products is to allow for greater standardization, transparency, and stakeholder buy-in. The Committee recognized the need to allow for the evaluation of attribution models in the future and to lay the groundwork to develop a more robust evidence base.

The guiding principles acknowledge the complex, multidimensional challenges to implementing attribution models as the models can change depending on their purpose and the data available. The Committee recognized the role that attribution can play in advancing national healthcare improvement priorities such as facilitating better care delivery, improving population health, and driving smarter healthcare spending.

The Committee highlighted the absence of a gold standard for designing or selecting an attribution model. Therefore, the Committee noted that it is important to understand the goals of attribution for each specific case when assessing potential attribution models to apply.

They also noted several key criteria to consider when selecting an attribution model: actionability, accuracy, fairness, and transparency. The guiding principles emphasize that this is particularly important as the application of an attribution approach for performance measures can significantly influence measure reliability, validity, and results. Moreover, attribution can significantly affect the size of the

population for whom facilities and clinicians are assigned responsibility, as well as potentially determine their performance under value-based payment programs. With these factors in mind, the Committee laid out the following guiding principles:

1. Attribution models should fairly and accurately assign accountability.
2. Attribution models are an essential part of measure development, implementation, and policy and program design.
3. Considered choices among available data are fundamental in the design of an attribution model.
4. Attribution models should be regularly reviewed and updated.
5. Attribution models should be transparent and consistently applied.
6. Attribution models should align with the stated goals and purpose of the program.

A challenge in the first report was the tension between the desire for clarity about an attribution model's fit for purpose and the state of the science related to attribution. The Committee recognized the need for rules to clarify which attribution model should be used in a given circumstance, but noted there was not enough evidence to support the development of such rules at this time.

A significant finding of the white paper commissioned during the first project was the current lack of a standard definition of the elements included in an attribution model. This lack of standardization across attribution models significantly limits the ability to evaluate the effectiveness of different approaches. The Committee noted that to evaluate attribution models it was first necessary to determine the necessary elements of an attribution model that should be specified. The Attribution Model Selection Guide was intended to aid measure developers, measure evaluation committees, and program implementers on the necessary elements of an attribution that should be specified. One goal of the guide was to enable stakeholders to have a structured dialogue about attribution models and the decisions made when developing, selecting, or evaluating an attribution model.

The Attribution Model Selection Guide was designed to present the minimum elements that should be shared with healthcare providers being held accountable under an attribution model (Table 1). The details of an attribution model, and the choices made in developing the model, should be transparent to patients, accountable entities, and other stakeholders. The first report emphasized that an attribution model must be well defined and precisely specified, with adequate testing so that it can be implemented consistently. The Attribution Model Selection Guide includes a series of key questions to answer in the development and selection of an attribution model and was intended to improve standardization across attribution models and increase the ability to evaluate attribution models in the future.

**Table C1. Attribution Model Selection Guide**

| | |
|---|---|
| **What is the context and goal of the accountability program?** | What are the desired outcomes and results of the program?<br>Is the attribution model evidence-based?<br>Is the attribution model aspirational?<br>What is the accountability mechanism of the program?<br>Which entities will participate and act under the accountability program?<br>What are the potential consequences? |
| **How do the measures relate to the context in which they are being used?** | What are the patient inclusion/exclusion criteria?<br><br>Does the model attribute enough individuals to draw fair conclusions? |
| **Which units will be affected by the attribution model?** | Which units are eligible for the attribution model?<br>To what degree can the accountable unit influence the outcomes?<br>Do the units have sufficient sample size to aggregate measure results?<br>Are there multiple units to which this attribution model will be applied? |
| **How is the attribution performed?** | What data are used? Do all parties have access to the data?<br>What are the qualifying events for attribution, and do those qualifying events accurately assign care to the right accountable unit?<br>What are the details of the algorithm used to assign responsibility?<br>Have multiple methodologies been considered for reliability?<br>What is the timing of the attribution computation? |

Building on the principles and Attribution Model Selection Guide, the Committee developed a series of recommendations. These recommendations were intended to apply broadly to developing, selecting, and implementing attribution models in the context of public and private sector accountability programs. When developing the recommendations, the Panel recognized the current state of the science, considered what is achievable now, and what the ideal future state is for attribution models. The recommendations stressed the importance of aspirational and actionable recommendations in order to drive the field forward:

- Use the Attribution Model Selection Guide to evaluate the factors to consider in the choice of an attribution model
- Attribution models should be tested

- Attribution models should be subject to multistakeholder review
- Attribution models should attribute care to entities who can influence care and outcomes
- Attribution models used in mandatory public reporting or payment programs should meet minimum criteria

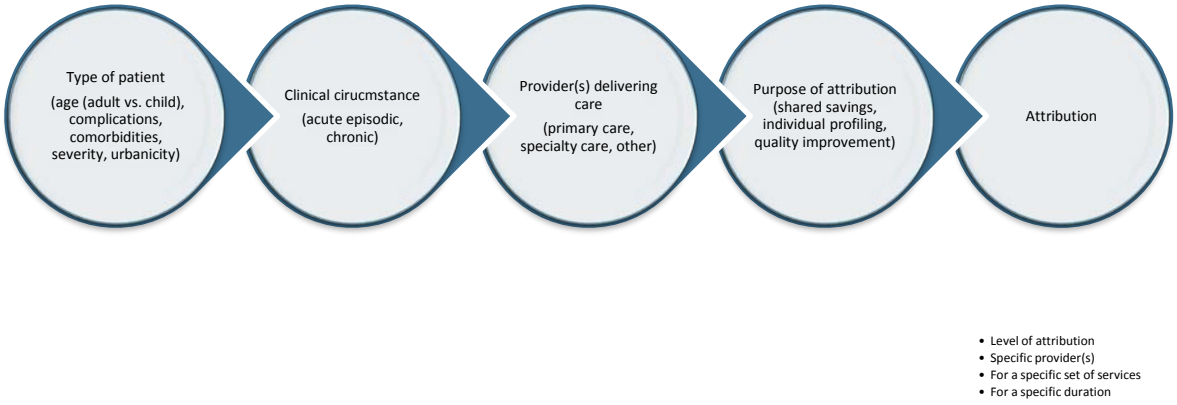
These products were designed to be used together to define the key elements of an attribution model, highlight key considerations for developing an attribution model, and emphasize the need for greater transparency and stakeholder consensus around attribution models and how they are used. However, the Committee recognized the need for additional work in this area and outlined several key questions and challenges that remained unanswered, including:

- Understanding how complex patients are handled
- Guidance on how attribution models could be tested and understanding what reliability and validity may mean in this context
- Developing a more robust evidence base to support the attribution model
- Outlining a process by which models could be subjected to a multistakeholder review.

## Summary of Attribution Model Elements

Attribution is a methodology to assign responsibility for a patient's healthcare outcomes and/or costs to an accountable unit. In a paper commissioned by NQF, Ryan et al. put forward a conceptual model for attribution. This conceptual model outlines a number of factors that determine appropriate attribution: type of patient, the clinical circumstances, and the provider(s) delivering care. The combination of these factors will lead to a patient being attributed to a certain provider (or providers), for a specific duration. Additionally, a 2017 technical paper by HealthPartners defines some of the key methodologies employed for each of these elements.

**Ryan et al. Conceptual Model of Attribution**



One key element of an attribution model is timing since attribution can be performed retrospectively or prospectively. Retrospective attribution uses data from the performance period to assign patients to an accountable unit based on patterns of use. Prospective attribution uses current data to assign patients to an accountable unit for the following performance period. Ryan et al found the majority of current attribution models use retrospective attribution. The second key element of an attribution model is the exclusivity of the attribution. Single attribution assigns a patient to one accountable unit while multiple attribution assigns a patient or a portion of a patient to more than one accountable unit. Next, there is the type of provider to whom care is attributed. Ryan et al found the majority of models attribute care to a physician, usually a primary care physician. Finally, there is the event used to trigger attribution- usually the majority of care or plurality of care.

## Appendix D: Key Informant Interview Guides

### Interview Guide for Providers

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 1 | Introductions/ Welcome | • NQF staff introductions<br>• Interviewee introductions<br>• Thank you for joining us, we appreciate your time |
| 2 | Purpose and overview of interview | • We don't have very much time to speak to you today, so we're going to jump right in!<br>• What we hope to learn<br>o We are using these interviews with key stakeholders with various perspectives and experience to help supplement our research of the literature and expert panel guidance to fill gaps where we still have lingering questions, and;<br>o To gain a better understanding of how people in the field are dealing with these issues in practical ways on a day-to-day basis<br>• Interview Overview<br>o Interview will be 1 hour, recorded, responses won't be attributed to you or your organization<br>o There is no expectation that you share confidential organizational information, patient information, or trade-secrets<br>o Tone of interview is hopefully conversational, ask questions or for clarifications at any time<br>• Brief Project Description<br>o This project is the second phase of a project initiated in 2015, which sought to explore attribution and provide guidance how to define it, identify the key challenges and provide guidance on building an attribution model. The 2 key outputs of the project were guiding principles on attribution and an attribution model selection guide.<br>• Purpose of interview<br>o For this effort we are focused on a set of specific attribution challenges that we identified in the first project but were unable to sufficiently address:<br>▪ Data challenges<br>▪ Attribution in team-based care<br>▪ Attribution challenges for special populations and special settings<br>▪ Testing for reliability and validity<br>o Are there any of these issues that your find of particular interest or that you have accumulated a fair amount of experience with? Other issues not mentioned? What were the most significant challenges you faced when implementing the attribution approach(es) currently used in your organization? |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 3 | Interviewee Role and Organization | • First we'd like to get a better understanding of your role and your organization:<br>o Can you give us a brief description of your role and responsibilities in your current position?<br>▪ Organization, department/division description<br>▪ Population served<br>▪ Region<br>▪ Organization type/stakeholder category<br>▪ Service lines |
| 4 | Experience with Attribution | • Discussion of how interviewee interacts with attribution issues<br>o Can you briefly describe how you interface with attribution (and associated challenges) within your organization? |
| 5 | Organization's approach/ general practices for attribution | • What types of attribution strategies currently affect your organization?<br>• Was your organization able to provide input into the attribution approaches affecting you?<br>o Do payers provide details of the algorithms with you?<br>o Did you receive any information about how the model was developed or tested?<br>o Are you able to able to provide feedback on the attribution models?<br>• Who are the attributable entities in the organization?<br>• How is information collected, analyzed and disseminated to the attributable entities within your organization?<br>• Are there any incentives or penalties currently associated with how attributable entities perform?<br>• Did your organization face any unintended consequences or unexpected challenges because of attribution?<br>o Would you say these challenges are specific to your organization, region/market, population you serve?<br>o Which aspects of these challenges make your experience unique? |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 6 | Challenges & Strategies | **(Questions based on interviewee stakeholder perspective/experience)**<br><br>• Based on prior discussion focus on one of these topics:<br>o Data challenges: (Pick from these based on conversation)<br>▪ Does your organization have access to the data used to determine attribution?<br>▪ Are there data integrity issues specific to ensuring accurate and fair attribution that you have experienced?<br>▪ Can the data collected for determining accountable entities be collected with measurement data? Have you found these to be overlapping or compounding burdens?<br>▪ Do the payers you are working with employ patient and/or clinician attestation of relationship to determine accountable entities? Associated challenges?<br>▪ When and how is performance data and attributed patients made available to you? Before, during, after measurement period?<br>o Team-based attribution:<br>▪ What type of strategies does your organization use to foster team based care?<br>▪ What strategies has your organization used to foster "buy-in" on attribution approaches from a wide set of perspectives, including patients, payers, clinicians?<br>▪ Do you think it is appropriate to hold non-clinicians accountable for portions of patient care? Under what conditions do you incorporate non-clinicians in attribution models?<br>▪ Have you faced any challenges with accountable entities who perceive a lack of control or responsibility for patients are attributed to them and their ability to influence those patients' outcomes or for improving performance? How has your organization approached these challenges?<br>o Special populations/settings:<br>▪ Do you work with certain patient populations that pose particular attribution challenges?<br>▪ Do you feel current models fairly attribute patients that may be complex?<br>▪ Do the attribution models you encounter use adequate exclusion criteria or risk adjustment? |
| 7 | Gaps in knowledge, evidence, organizational needs | • What types of resources, evidence-based research, guidance or other information would be useful to you/your organization in addressing the attribution challenges you face?<br>• Is there anything else we should know about the attribution challenges providers face? |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 8 | Wrap-up | • Recapping any follow up items<br>o If time runs out, would they mind responding to some questions in writing via email?<br>• Explain how to access the report when it goes out for comment<br>• Thank you's/ Close |

## Interview Guide for Implementers

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 1 | Introductions/ Welcome | • NQF staff introductions<br>• Interviewee introductions<br>• Thank you for joining us, we appreciate your time |
| 2 | Purpose and overview of interview | • We don't have very much time to speak to you today, so we're going to jump right in!<br>• What we hope to learn<br>  o We are using these interviews with key stakeholders with various perspectives and experience to help supplement our research of the literature and expert panel guidance to fill gaps where we still have lingering questions, and;<br>  o To gain a better understanding of how people in the field are dealing with these issues in practical ways on a day-to-day basis<br>• Interview Overview<br>  o Interview will be 1 hour, recorded. Comments will not be attributed to you or your organization.<br>  o There is no expectation that you share confidential organizational information, patient information, or trade-secrets<br>  o Tone of interview is hopefully conversational, ask questions or for clarifications at any time<br>• Brief Project Description<br>  o This project is the second phase of a project initiated in 2015, which sought to explore attribution and provide guidance how to define it, identify the key challenges and provide guidance on building an attribution model. The 2 key outputs of the project were guiding principles on attribution and an attribution model selection guide.<br>• Purpose of interview<br>  o For this effort we are focused on a set of specific attribution challenges that we identified in the first project but were unable to sufficiently address:<br>  ▪ Data challenges<br>  ▪ Attribution in team-based care<br>  ▪ Attribution challenges for special populations and special settings<br>  ▪ Testing for reliability and validity<br>  o Are there any of these issues that your find of particular interest or that you have accumulated a fair amount of experience with? Other issues not mentioned? What were the most significant challenges you faced when implementing the attribution approach(es) currently used in your organization? |
| 3 | Interviewee Role and Organization | • First we'd like to get a better understanding of your role and your organization:<br>  o Can you give us a brief description of your role and responsibilities in your current position?<br>  ▪ Organization, department/division description<br>  ▪ Population served<br>  ▪ Region<br>  ▪ Organization type/stakeholder category<br>  ▪ Service lines |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 4 | Experience with Attribution | • Discussion of how interviewee interacts with attribution issues<br>  o Can you briefly describe how you interface with attribution (and associated challenges) within your organization? |
| 5 | Organization's approach/ general practices for attribution | • What types of attribution strategies are currently employed in your organization?<br>• How were the attribution approach(es) developed or selected?<br>  o Did you use any tools or research to guide your selection of an attribution approach?<br>  o Were you aware of the NQF attribution model selection guide?<br>  o How did you test the model before it was implemented (e.g., reliability, validity)<br>• Who are the attributable entities in the organization?<br>• How is information collected, analyzed and disseminated to the attributable entities within your organization?<br>• Are there any incentives or penalties currently associated with how attributable entities perform?<br>• Did your organization face any unintended consequences or unexpected challenges with rolling out this approach?<br>  o Would you say these challenges are specific to your organization, region/market, population you serve?<br>  o Which aspects of these challenges make your experience unique? |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 6 | Challenges & Strategies | Based on prior discussion focus on one of these topics:<br>• Data challenges: (Pick from these based on conversation)<br>o Has your organization experienced any setting-specific challenges to collecting data? If so, please describe.<br>o What are some of the challenges your organization has faced in systematically collecting the necessary data elements for attribution?<br>o How has the availability of pharmacy claims data influenced your ability to determine level of accountability for practitioners or perform economic profiling?<br>o Have you encountered challenges with identifying sufficient sample ("N") of attributable population for physician/practitioner-level attribution?<br>o Are there data integrity issues specific to ensuring accurate and fair attribution that you have experienced?<br>o Can the data collected for determining accountable entities be collected with measurement data? Have you found these to be overlapping or compounding burdens?<br>o Does your organization use data other than claims to determine accountable entities? If yes, what are those data sources? Are there additional challenges with these data sources that affected the design or implementation of your attribution approach?<br>o Does your organization employ patient and/or clinician attestation of relationship to determine accountable entities? Associated challenges?<br>o When and how is performance data and attributed patients made available to providers? Before, during, after measurement period?<br>• Team-based attribution:<br>o What strategies has your organization used to foster "buy-in" on attribution approaches from a wide set of perspectives, including patients, payers, clinicians?<br>o Do you think it is appropriate to hold non-clinicians accountable for portions of patient care? Under what conditions do you incorporate non-clinicians in attribution models?<br>o Have you faced any challenges with accountable entities who perceive a lack of control or responsibility for patients are attributed to them and their ability to influence those patients' outcomes or for improving performance? How has your organization approached these challenges?<br>• Special populations/settings:<br>o Are there any special patient populations that require specific attribution considerations?<br>o Any care settings that are more challenging to attribute?<br>• Reliability and validity testing:<br>o What approaches, if any, has your organization employed to ensure the reliability and validity of the performance data attributed to your practitioners?<br>o What were your key findings that led to the selection of the model(s) that you ultimately selected for implementation?<br>o Empirical testing? Face validity? Comparison to other approaches?<br>• How has your organization overcome/addressed these challenges?<br>o Who was involved?<br>o How much time did it take?<br>o What were the trade-offs? |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 7 | Gaps in knowledge, evidence, organizational needs | • What types of resources, evidence-based research, guidance or other information would be useful to you/your organization in addressing the attribution challenges you face? |
| 8 | Wrap-up | • Recapping any follow up items<br>o If time runs out, would they mind responding to some questions in writing via email?<br>• Explain how to access the report when it goes out for comment<br>• Thank you's/ Close |

## Interview Guide for Consumers

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 1 | Introductions/ Welcome | • NQF staff introductions<br>• Interviewee introductions<br>• Thank you for joining us, we appreciate your time |
| 2 | Purpose and overview of interview | • We don't have very much time to speak to you today, so we're going to jump right in!<br>• What we hope to learn<br>  o We are using these interviews with key stakeholders with various perspectives and experience to help supplement our research of the literature and expert panel guidance to fill gaps where we still have lingering questions, and;<br>  o To gain a better understanding of how people in the field are dealing with these issues in practical ways on a day-to-day basis<br>• Interview Overview<br>  o Interview will be 1 hour, recorded. Comments will not be attributed to you or your organization.<br>  o There is no expectation that you share confidential organizational information, patient information, or trade-secrets<br>  o Tone of interview is hopefully conversational, ask questions or for clarifications at any time<br>• Brief Project Description<br>  o This project is the second phase of a project initiated in 2015, which sought to explore attribution and provide guidance how to define it, identify the key challenges and provide guidance on building an attribution model. The 2 key outputs of the project were guiding principles on attribution and an attribution model selection guide.<br>• Purpose of interview<br>  o For this effort we are focused on a set of specific attribution challenges that we identified in the first project but were unable to sufficiently address:<br>  ▪ Data challenges<br>  ▪ Attribution in team-based care<br>  ▪ Attribution challenges for special populations and special settings<br>  ▪ Testing for reliability and validity<br>  o Are there any of these issues that your find of particular interest or that you have accumulated a fair amount of experience with? Other issues not mentioned? What were the most significant challenges you faced when implementing the attribution approach(es) currently used in your organization? |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 3 | Interviewee Role and Organization | • First we'd like to get a better understanding of your role and your organization:<br>o Can you give us a brief description of your role and responsibilities in your current position?<br>▪ Organization, department/division description<br>▪ Population served<br>▪ Region<br>▪ Organization type/stakeholder category<br>▪ Service lines |
| 4 | Experience with Attribution | • Discussion of how interviewee interacts with attribution issues<br>o Can you briefly describe some of the attribution challenges you have encountered in your work that affect consumers or patients the most? |
| 5 | Challenges & Strategies | **(Questions based on interviewee stakeholder perspective/experience)**<br><br>• From your experience, who do you think consumers see as the provider responsible for their care?<br>o How can we make attribution models align more with the consumer's perspective?<br>• Patient/Provider Attestation:<br>o Many plans require patients to self –select a provider to whom they are attributed. However, sometimes, the patient does not end up seeing this provider for a host of reasons, or seeing another provider for the majority of their healthcare encounters.<br>▪ What are your thoughts on how this should be adjudicated (who wins)? Have you encountered any innovative strategies for determining the true patient-provider relationship that incorporates consumer designation?<br>• Unattributed patients/high risk patients:<br>o One of the challenges with attribution we have identified is that the patients with the most need for care are often unattributed, leaving them without a responsible provider to maintain and monitor their health. These patients have not encountered the healthcare system and therefore have no claims with which to determine how they should be attributed.<br>▪ Have you encountered any innovative strategies for getting these people into the healthcare system? What are the biggest barriers to ensuring these patients are seen and appropriately cared for?<br>• Unintended consequences:<br>o Have you encountered any unintended consequences of attribution specifically for the consumer/patient? (obvious is when the provider is not bought in to the assignment of the patient to their panel and so no effort is made to reach out or improve health outcomes of the patients in the panel. |

| # | Topic | Questions/Discussion Guidance |
|---|---|---|
| 6 | Gaps in knowledge, evidence, organizational needs | • What types of resources, evidence-based research, guidance or other information would be useful to you/your organization in addressing the attribution challenges you face?<br>• How can consumers use attribution information to feel more empowered to take an active role in their care?<br>• Do you have any ideas about ways to make information about attribution more accessible to consumers? |
| 7 | Wrap-up | • Recapping any follow up items<br>o If time runs out, would they mind responding to some questions in writing via email?<br>• Explain how to access the report when it goes out for comment<br>• Thank you's/ Close |

## Appendix E: Detailed Survey Results

**Table 1. Use Testing of and Survey Responses Evaluating the Attribution Selection Guide.**

| Selection Guide Elements | Use Case Testing: Areas identified for further guidance | Survey Response Themes: Evaluating the Selection Guide |
|---|---|---|
| What is the context and goal of the accountability program? | • Clarify what evidence could be used to support an attribution model<br>• Balance evidence and supporting innovation<br>• Understanding the role of stakeholder buy-in<br>• Distinction should be made between mandatory programs and voluntary programs<br>• What are the considerations for team-based care?<br>• What are the considerations for specialty care?<br>• Models should balance catalyzing improvement with potential harms to patients and providers | • Difficulties in accounting for differences between EHR systems and programmatic designs |
| 2. How do the measures relate to the context in which they are being used? | • Align program level and measure level attribution<br>• Are there other specifications that should be examined?<br>• Can developers demonstrate this with empirical reliability testing? | • Need to expand the Guide with worked examples from existing measures, and sample answers to questions.<br>• Questions should be more specific and quantifiable, citing edge cases such as deceased patients where the "correct" attribution path was left unclear.<br>• Data availability issues, particularly sample sizes. |

| Selection Guide Elements | Use Case Testing: Areas identified for further guidance | Survey Response Themes: Evaluating the Selection Guide |
|---|---|---|
| 3. Which units will be affected by the attribution model? | • How should team-based care be considered?<br>• How can you determine a provider's locus of control?<br>• How do you determine which providers hold the most responsibility for driving resource use and outcomes, if it includes a matter of judgment?<br>• Does provider or multi-stakeholder input provide a transparent, neutral opportunity for evaluation?<br>• Is a measure reliable and valid after attribution is performed? | • Expand the Guide with benchmarks, or techniques to develop good benchmarks.<br>• A measure may be topped out – guidance or a definition would be helpful in determining when a measure was no longer appropriate for use in the model.<br>• Clarify the term "multiple units". |
| 4. How is the attribution performed? | • How should attribution models be tested?<br>• How can transparency be ensured?<br>• Are there preferred methodologies at this time?<br>• Should certain events or settings not be used as qualifying events?<br>• What information should be provided to accountable units?<br>• How should the consistency of the attribution model, or patient-provider relationship across multiple attribution methods be considered?<br>• How should one judge reliability of the attribution model? | • Question whether it was appropriate to permit "all parties" to have access to the underlying data informing the attribution model collection, citing privacy and quality concerns.<br>• Many of these questions overlapped with similar questions in determining scientific acceptability. |

**Table 2. Survey Response Themes Related to other Domains**

| Additional Survey Domains | Survey Response Themes |
|---|---|
| Improving Guide format and uptake | • Guide is not widespread, and suggested significant promotional work (e.g. educational and outreach activities) to regularize use of the Guide in selection attribution models.<br>• Design a fillable form or some other electronic tool that would permit the inclusion of additional context-sensitive guidance while retaining the concise question-led format of the current guide. |
| Evidence you use to support attribution approaches | • Peer-reviewed publications, data from large set, technical expert panels |
| Considerations for special populations or settings, such as home care, or pediatric patients | • Risk-adjustment for social risk factors, language barriers, response bias |
| Approaches to ensure the reliability and validity of the performance data attributed to practitioners | • Technical expert panels, interrater reliability and other statistical tests |